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Producer Perceptions Of Their Use Of Time And Various Areas Of Risk In Their Business

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PRODUCER PERCEPTIONS OF THEIR USE OF TIME AND VARIOUS AREAS OF RISK IN THEIR BUSINESS

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ABSTRACT

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Agribusinesses rely on producers choosing their products and services for the success of their business. Agribusinesses can use information regarding how producers rate the importance of certain areas of risk and what takes most of the producers' time to offer specific services to different segments of producers to better meet their needs. An ordered logit model and a multinomial logit model are used to determine factors significant to producers' use of time and importance of various areas of risk. The producers are then segmented into groups based on their risk perceptions.

From this research, agribusinesses can recognize that different types of producers will view risks as more important and will spend most of their time differently. It is important to recognize these differences between producers and have conversations with producers about making their operation more efficient or about risks that are important to them. Relating to producers will allow agribusinesses to get their attention and potentially allow them to win their business. Agribusinesses should also offer multiple products that would meet the needs of the different segments of producers.

CHAPTER 1. INTRODUCTION

1.1 Overview

Agriculture companies across the United States and across the world are daily trying to win the business of farm managers. As Alexander, Wilson, and Foley wrote, "Developing effective marketing strategies, and anticipating the needs of current and future customers is one of the most significant challenges faced by agribusiness firms" (2005, p. 114). Understanding how farm risk affects decision making will continue to be an important research focal point for these agricultural companies who rely on the business of farmers to succeed. Two producer perceptions that can be used to separate segments of producers are the importance of risk and time allocation perceptions. Both of these can greatly impact who producers choose as a retailer, so it is important for companies to separate producers into segments and offer services that complement their needs. Peter Barry wrote about the importance of risk in agriculture saying, "Risk management in agriculture has commanded substantial resources from farmers, agricultural lenders, agribusinesses, and the public sector" (Barry 1984, p. 3). As we can see from this statement, risk in agriculture and how producers manage it can have large impacts not only on their farms but on the whole industry.

A survey completed in 1996 by USDA asked farmers about their level of concern regarding factors affecting their farming operations (Harwood, Heifner, Coble, Perry, and Somwaru 1999). This survey was probability based so the results were able to be

extended across the entire U.S. farm sector. In the survey, some of the concerns included were "uncertainty in commodity prices," "ability to adopt new technology," and "lawsuits." Producers valued each concern from "not concerned" to "very concerned." The results from this survey showed that different types of producers had different risk focuses. The 2013 Large Commercial Producer survey used similar risk questions and procedures to those found in the USDA survey.

The USDA forecasted that farm income would be down 26.6% in 2014 from 2013's forecast. They also estimated declines in crop cash receipts and values of crop inventories (U.S. Department of Agriculture, 2014). Different segments of producers will have to use different strategies to efficiently manage their time and the risks they face under these tighter economic conditions. It is important for retailers to recognize these different groups because under tighter economic circumstances producers will look to work with retailers who offer specific services that meet their needs.

Agricultural retail businesses in the past have recognized the advantages of segmenting producers and offering specific services to them, especially in buyer segments (Alexander et al. 2005, Gloy and Akridge 1999). Now with retailers facing tighter economic circumstances, segmenting producers based on how they view the importance of various areas of risk and the time they spend on different management areas of the farm may be important factors. Retailers can use this information to determine which specific services should be offered to the different segments.

1.2 Problem

The success of agricultural retail businesses is affected by producers' time allocation and risk perceptions, which requires retailers to recognize groups of producers based on these characteristics and offer specific services to them. Producer risk perceptions are individually based, so agribusinesses have to recognize that each producer has specific concerns based on their unique operation.

1.3 Objectives

The objective is to determine segments of producers to inform retailers' marketing strategies for each of their target markets which will allow retailers to be more profitable. The analysis will use several specific objectives to accomplish this goal.

1. Develop an ordered logit model to determine the likelihood of a producer rating a risk at a certain level.
2. Develop a multinomial logit model to determine the likelihood of a producer choosing an area that takes most of their time.
3. Segment producers into groups based on their risk perceptions.
4. Use segment information and demographics to predict producers into segments.

1.4 Hypothesis Statements

1. Producers with different risk perceptions will have different characteristics
    a. Producers with higher risk perceptions of yield risk are older than other producers
    b. Producers with higher risk perceptions of physical resources will be younger than other producers
2. Producers with different time perceptions will have different characteristics
    a. Smaller producers will spend more time managing land, equipment, and facilities than other producers
    b. Producers with higher gross farm sales spend more time managing people than producers with lower gross farm sales
3. Crop producers will perceive risks differently than livestock producers
    a. Livestock producers will rank society's view of something happening on their farm as more of a risk than crop producers
4. The primary operator will perceive risk and time differently than an employee.
    a. The primary operator rates risk more highly than employees do.
5. Different segments of producers will have different characteristics.
    a. Livestock producers will be in a different segment than crop producers
    b. Producers with larger gross farms sales will be in a different segment than producers with smaller gross farm sales

Definitions:

Producers: Farmers that were surveyed that are representative of the whole United States

Risk Perceptions: The view that producers have of risk importance

Characteristics: Includes demographics and responses to questions i.e. age, education, type of producer.

Physical Resources: assets including land and equipment

Time Perceptions: The view that producers have on how they spend most of their time

Crop Producers: Farmers that grow cotton, corn, soybeans, wheat, fruits, nuts or vegetables

Livestock Producers: Farmers that raise cattle, hogs, or milk dairy cattle

Primary Operator: The main farm decision maker

Employee: Someone who works under the primary operator

1.5 Organization of Thesis

The remainder of the thesis will be separated into four chapters. First, the literature review will explore the past research on risk and segmenting markets. Then, the data and methodology chapter will explain from where the data for this research was obtained and the methods used to analyze it. The results chapter presents the findings obtained from the models. Lastly, the conclusion summarizes the research findings.

CHAPTER 2. LITERATURE REVIEW

2.1 Overview

Producers face many types of risk in their business including price risk, weather, yield uncertainty, and strategic risks that impact how they run their business including with which agricultural retailers they work. This chapter will first explore the importance of risk and why it is a focus of this study. Then we will explore how risk perceptions have been measured in previous research. Finally, we examine gender differences in risk perception, segmentation, and time allocation in agriculture.

2.2 Importance of Risk

In agriculture, risk is a factor that is consistently discussed and on which much research has focused. There are several books and articles that layout the importance of risk in agriculture and why it should be further explored. In their book, Hardaker, Huirne, Anderson, and Lien, explained that the differences between risk and uncertainty in agriculture are distinct (2004). Risk has uncertain consequences and has a value. Uncertainty generally is defined as imperfect knowledge (Hardaker et al. 2004). In this study we focused on nine risks that producers face.

Most people dislike risk and will give up some return to limit the risk they have in their business. Thus, Hardaker et al. advise that risk aversion has to be taken into account

when looking at farm decision making (2004). It is important to also recognize that there is upside potential with the risks associated with farms. A year where producers have higher than normal yields may offer a higher return. Farming is a high-risk, high-reward industry like many others, but managing the risks determines if producers will be able to handle unfavorable outcomes (Patrick 1998). Risk in agriculture does not just impact farmers, it impacts the entire agricultural sector. Risk management strategies for different farms may cause them to be slow in adopting new technologies. This causes production to be less efficient and results in lower outputs than if there was less risk for the farmers. Producer responses to shifts in demands are often slower than they would be if there was lower risk. So the risk in agriculture is important not only farmers but also farm advisors, commercial firms selling to or buying from farmers, agricultural research workers, and policy makers and planners. Suppliers of inputs to producers have to recognize the risk producers are taking on when using a new product and have to help the producers better manage the risk so they will try a new product. Options such as leasing arrangements rather than buying a product make a farmer more likely to consider new products (Hardaker et al. 2004).

An article by Miller, Dobbins, Pritchett, Boehlje, and Ehmke, outlined the sources of risk in agriculture which include: production risk, price risk, casualty risk, technological risk, uncertainty caused by other peoples' actions, legal uncertainty, and personal uncertainty (2004). These risks were classified into two categories: operational risks and strategic risks. Operational risk includes business and financial risk. Strategic risks include 1) political, government policy, macro-economic, social and natural contingencies, and 2) industry dynamics involving input markets, product markets, and

competitive technological uncertainties. Operational risk is often easier to manage than strategic risk. There are different ways to manage the risks which include: (1) avoidance, (2) reduction, (3) assumption/retention, and (4) transfer. There are strategies to manage operational risks such as financial strategies, marketing strategies, production strategies, and insurance. Strategic risks are less predictable, but a few managing strategies include: positioning for flexibility, positioning to avoid, positioning to absorb, contingency planning, implementing flexibility, and exit strategies. Time and risk are also mentioned in the article. Time can be seen as a virtue when there is a risky environment. A time delay allows additional types of information to be obtained including: information about the odds, changes in the environment which alters probability, changes in accuracy of estimating payoffs, and changes in the environment that alter the results which alters actual payoffs (Miller et al. 2004).

Patrick laid out similar facts about risks in farming in his article (1998). Farmers are in a risky environment, often making decisions without knowing what the consequences will be. Making decisions under risky circumstances involves attitudes towards risk, ability to bear risk, and formation of expectations about the future. Setting farm family goals helps producers establish where they want to go and then look at how decisions will affect these goals. It is also important to recognize the risk attitude an individual has. Risk attitudes include: “avoiders,” “daredevils,” “adventurers,” and “calculators.” Another factor important in decisions is the ability of the individual to take on risk, which looks at the solvency and liquidity of his/her financial position (Patrick 1998).

Gabriel and Baker focused on business and financial risk being thought of as trade-offs for one another in their article (1980). Business risk is defined as the risk inherent in the firm. It is normally seen through fluctuation in net cash flows. The market and the biophysical environment are two of the major sources of business risk. Financial risk includes the risk of cash insolvency. Often financing decisions play a large role in this. Risk balancing is often used to manage both business and financial risk. It was found that farmers made financial adjustments leading to decreased financial risk in response to a rise in business risk and vice versa (Gabriel and Baker 1980).

In a 2001 study, Escalante and Barry used optimization techniques to look at the synergy between risk balancing and alternative risk reducing strategies. It was found that highly risk-averse producers preferred risk-management plans that have offsetting risk reducing benefits of most strategies and profit-generating capacities of others. A farm that has more diversified plans will also see reduction in their financial risk (Escalante and Barry 2001).

Another risk balancing hypothesis was studied using an econometric model that had a constraint on expected utility maximization with respect to farm financial structure. The cluster method was used to find the farms that were the most efficient under expected utility maximization with given risk attitudes and actual interest rates. It was found that risk balancing is conditional and farm characteristics did affect risk balancing. Farms with lower risk aversion and higher return often had risk balancing behaviors (Yan, Katchova, and Barry 2004).

These sources have helped us understand what risk is in agriculture and the important role that risk has in the agricultural industry. Risk affects not only producers

but also the agribusinesses with which farmers work. Effectively managing risk has to be a priority for producers to succeed in this industry and for the agricultural industry to succeed as a whole.

2.3 Measuring Risk Perceptions

Because risk is inherent in agriculture, measuring risk perceptions has been investigated in many studies. The most common way that risk perceptions are measured is through survey questions. We will examine several studies that have been used to measure respondents' risk perceptions.

In a 1996 survey conducted by the USDA, producers were asked to rank their concern for factors that may affect their farms. This survey defined the sources of risk in farming as: production or yield risk, price or market risk, institutional risk, human or personal risks, and financial risk (Harwood et al. 1999). Production or yield risks are often affected by weather including flooding conditions, drought conditions, hail, and extreme temperatures. Price or market risk is from the changes in input or output prices that are not foreseen and can make growing a specific crop less profitable. Institutional risk includes risk from changes in policies and regulations. Human or personal risks include death, divorce, and injury as well as asset risk and contractual risks. Financial risk occurs from capital and operating expenses being financed. The changes in interest rates can alter cash flows for the business. This survey showed that grain, tobacco, and cotton producers were more concerned with yield and price variability than the other categories. Beef, poultry, and other field crop producers were most concerned with laws

and regulations. The data also found that across all farms the highest concern was changes in government laws and regulations, with decreases in crop yields or livestock production coming in second (Harwood et al. 1999).

Another survey that focused on risk and grain marketing behavior was analyzed by Musser, Patrick, and Eckman (1996). The purpose of the research was to determine the effects of risk and farm characteristics on pre-harvest marketing techniques. Producers answered surveys regarding their forward pricing methods and their risk attitudes. The risk premium was determined by producers' response to the statement, "I am more concerned about a large loss in my farm operation than missing a substantial gain," on a five-point Likert scale. Yield risk premium was determined by producers' responses to the percentage of their expected corn and soybean yields with current practices they would give up to have yields that did not vary from year to year. It was found that many of these producers did forward contract their crops. Age and education affected short run marketing percentages but not long run. Variability of yields did not have a short or long run impact on marketing decisions. The yield risk premium variable was significant in the short run, while attitude towards losses was significant in the long run. Risk premium was negatively related to risk preferences (Musser et al. 1996).

A similar survey was conducted by Patrick, Wilson, Barry, Boggess, and Young to determine producer attitudes towards risk and management responses (1985). Respondents in 12 states and across 5 farm categories were surveyed. The survey included questions that asked producers to rank sources of variability that would create risk to their operation. Respondents were also asked to rank the importance of risk management responses and whether they use each tool. This survey found that weather

was the highest ranked source of variability and crop prices ranked second. Other important sources of risk included inflation, input costs, disease and pests, world events, and safety and health. The least important sources were hired labor, leasing cropland, and technology.

For livestock producers, livestock prices were the most important factor and operating input costs ranked second. Marketing responses to risk differed among the different producers. Greater than 90% of producers obtained market information, but not all producers viewed the information as highly valuable. Spreading sales and forward contracting were also used by 77% of respondents, with forward contracting having more importance for mixed farming and cotton producers.

The survey also found that in general producers used a "philosophy of life" strategy to make decisions rather than an optimization criterion (Patrick et al. 1985). Producers in different areas and of different farm types had different decision making strategies and risk techniques. Gathering and using information for financial and marketing decisions had a significant impact on their success.

In a 2007 study, Patrick, Peiter, Knight, Coble, and Baquet asked questions similar to the above study. The authors asked hog producers' questions regarding sources of risk, effectiveness of risk management strategies, and interest in more risk education. The study found that larger hog operations had higher risk ratings for the sources of risk than small scale producers (Patrick et al. 2007).

Riley and Anderson utilized survey questions to measure the perception of price risk (2009). There are several tools to manage price risk in agriculture which include futures and options contracts, forward contracts and insurance products. It is found that

many producers do not use these price risk management tools. The study looks at producers' price and price variability expectations which impact their management decisions. It was found that producers were overly optimistic with their price expectations. Producers also tended to underestimate price variability. Because price expectations were higher than the market implied producers would be expected not to use futures because they believe they will see a higher price in the future. Also, because risk is underestimated the management tools were too expensive for them to want to use.

In another study, Xu, Alexander, Patrick, and Musser, recognized that producers' risk perceptions have been a concern for agricultural economics for many years (2005). This study looked at farmers' attitudes and their observed behavior. Several risk questions along with a Myers-Briggs test were asked to producers. It was found that the producers' risk attitudes in various areas of the farm tended to be similar. It was also found that farmers' demographic and socioeconomic characteristics did impact production decisions. Older farmers tended to use fewer varieties of corn hybrids (Xu et al. 2005).

In a 1997 study, Blank, Carter and McDonald explored why tools to manage some risks, including price risk and yield risk, were not widely used even though producers were typically faced with variability of annual net income levels. The goal of this study was to determine if producers were voluntarily accepting their level of risk exposure or if the risk management tools available were not effective. The survey broke risks into two categories: production risks such as pests, drought, floods, frost, and labor availability and the second, market risks, such as output price, input cost, and labor cost. Output price and input cost were first and second in importance according to the survey. Only

23% used forward contracting and 6% used hedging. It was found that half of producers used diversification strategies to manage risks. From these results it was found that tools to manage price risk with certain commodities were missing and so were some yield risk management tools (Blank et al. 1997).

Bond and Wonder recognized that risk is an obvious part of the agricultural environment, but understanding the attitudes farmers have towards risk was not well understood in their 1980 study. The authors worked to find a procedure to measure risk attitudes and then implement this into a questionnaire for producers. To determine risk attitude, a risk premium and net monetary return to the farm enterprise over some defined period were considered and a utility function was used. Responses to survey questions about different risks were plugged into the utility function to determine their risk preference. It was found that risk aversion is the most prevalent risk attitude, but producers often had strategies that were similar to risk neutral behavior (Bond and Wonder 1980).

In a 2003 study, Hall, Knight, Coble, Baquet, and Patrick surveyed beef cattle producers in Texas and Nebraska to evaluate perceptions of sources of risk, effectiveness of risk management strategies, and interest in further risk management education. The study used probit analysis to examine these factors. Producers chose drought and cattle price variability as factors that had the most risk of affecting income. Extremely cold weather and disease were rated the next most risky factors. The most effective strategy producers' chose to reduce their risk was maintaining animal health. It was found that 51% of producers said they did not have enough knowledge as the main reason they did

not use futures or options, but they did not desire further risk management education (Hall et al. 2003).

Understanding how producers perceive risk is an important part of the agricultural industry. This knowledge allows research to focus on the areas and specific types of producers that have more risk exposure. The studies above give a strong base for the types of questions asked in surveys and the findings discovered.

2.4 Gender Differences

Gender is a factor that has been identified as important in determining how an individual rates or views risks. In 1994, Flynn, Slovic, and Mertz surveyed a large random sample of individuals in the United States. The respondents were asked to rate the risks associated with 25 hazards. The answers were rated on a scale from 1 to 4 where 1 was "almost no health risk" to 4 "high health risk". The results found that a higher percentage of women rated each of the risks as a high risk compared to males (Flynn et al. 1994).

Similar results were found in a study by Barsky, Kimball, Juster, and Shapiro, where participants were asked to respond to hypothetical situations that would reveal their risk perceptions, time preferences and willingness to substitute (1997). The risk aversion was determined by their willingness to gamble on lifetime income. There were four responses to the hypothetical situations which allowed the respondents to be separated based on the different responses. It was found that males were somewhat more risk tolerant than females. It was also found that respondents under 55 years old chose

the least risk tolerant option infrequently and the group of over 70 years old chose the most risk tolerant option more often than the other groups (Barsky et al. 1997).

In a 1998 study, Jianakoplos and Bernasek focused on determining the relationship between relative risk aversion and wealth. To do this, they used survey information from individuals and couples to regress the proportion of risky assets on the individual's wealth. They also included other economic and demographic variables that could impact the results. The results suggest that women are more risk averse than men. It also found that risk taking is altered by the number of people in a household that are under 18 years old. As the number of people under 18 increased, the proportion of risky assets for single women decreased significantly. Overall, the study found women to be significantly more risk averse in financial decision making than men (Jianakoplos and Bernasek 1998).

There have been several findings where women have responded differently to survey questions based on their risk perceptions. Women typically are more risk averse than men which can impact how women and men manage these risks.

2.5 Segmentation

Cluster analysis is a method used by different parts of the agricultural industry to segment producers based on producer characteristics or responses to surveys.

One study by Alexander et al. used cluster analysis to separate buyers into five groups for input purchases. A two-step process was utilized to determine the clustering algorithm. First, Ward's method was used to determine the correct number of clusters,

then the cluster results were used to begin a non-hierarchical k-means algorithm. Five clusters were identified and a multinomial logit model was also used to predict segment membership of producers based on personal demographics. Retailers rely on producer purchases for their success so recognizing groups of producers and working to meet their needs is important. The study identified these five groups which fit into three larger groups: business buyers, economic buyers, and relationship buyers (Alexander et al. 2005).

In a similar study, commercial farms were also separated into segments for agricultural inputs. To determine the segments, two hierarchical clustering methods were again used, Ward's method and average linkage method. Using these methods the number of clusters were determined and the means of the clustering variables were then used in the k-means algorithm. Using the methods, four segments were identified: balance, convenience, performance, and price (Gloy and Akridge 1999).

In study by Rosenburg and Turvey, cluster analysis was used to develop a classification system for different groups of producers that need different types of farm management assistance (1991). A survey was conducted that asked producers to specify their type of swine production. The clustering method used was an a priori approach, which resulted in four classifying variables (Rosenburg and Turvey 1991).

2.6 Time Allocation

There are a significant number of articles that examine the relationship between farm operators working on the farm and off the farm (Sumner 1982; Kim and Zepeda

2004; Kimhi 1996). There are, however, no articles that examine how producers spend their time on the farm. The Large Commercial Producer survey provides an opportunity to explore how large producers manage their time on the farm, which can add value to agribusinesses and the agricultural industry. Agribusinesses can explore how they can help producers alleviate time pressure.

2.7 Summary

This chapter contains a literature review of sources related to measuring and analyzing risk in agriculture. It started by explaining the role risk has in agriculture and why risk is important. Next, it explored how to measure producers' perception of risk, differences in risk perceptions based on gender, and cluster analysis to segment producers. There are numerous sources that discuss farm risk and several sources that look at segmenting producers; however, there were no sources that looked at segmenting producers based on their risk perceptions. Lastly, it was recognized that there are no insights into how large producers spend their time, which could be useful to agribusinesses. The next chapter will discuss the data collected and the methods utilized to predict the likelihoods of producers' rating the importance of risk, spending their time in a particular area, and segmenting producers based on their risk perceptions.

CHAPTER 3. DATA AND METHODOLOGY

3.1 Introduction

This chapter explains the data and methods that were used in this research. The data for this research was collected by the Center for Food and Agricultural Business at Purdue University through its 2013 Large Commercial Producer Survey. This chapter explains how the data was collected, the survey questions used, and the characteristics of respondents. This chapter will also discuss the methods used to analyze this information which includes ordered logit modeling, multinomial logit modeling, factor analysis, and cluster analysis.

3.2 Data

The Large Commercial Producer Survey was sent to producers between January and March of 2013. The survey was collected by mail, telephone, and email which resulted in more than 2,300 responses to the survey. A copy of the survey is included in Appendix A. There were two responses dropped initially because the acres entered were unreasonable. Additional responses were dropped when producers did not respond to the questions of interest relevant for that area in this study. The largest number of respondents used in any model in this study was 1,897. There were seven enterprises targeted by the surveys: corn and soybeans; wheat, barley and other small grains; cotton;

fruit, nuts and vegetables; dairy; hogs; and cattle. The states that accounted for 75 percent of total U.S. production were identified and a sample of producers in those states were contacted for the survey. In order to get the desired number of responses from larger farmers, these producers were surveyed at a much higher rate.

The survey asked producers about their demographics including age, education, gross farm sales, size of operation, and the type of operation. Crop producers and livestock producers are likely to manage their operations differently so they are separated in different parts of this study to determine any differences. There were 341 producers that identified as producing both crops and livestock. Table 3.1 shows the average number of acres for the crop producers by each enterprise. There were 1,664 producers that responded to the acres of crops they planted. The average number of acres for corn was 660, for soybeans it was 591, for wheat, barley and other grains it was 775, for cotton it was 854, for potatoes it was 512, for tomatoes it was 202, and for other fruits, nuts, and vegetables it was 499.

Table 3.2 shows the average number of animals for the different livestock enterprises. The average number of: cows being milked was 519; finished pigs was 10,686; feeder pigs was 39,186; finished cattle was 719; custom cattle was 1,075; and custom heifers was 372. There were 837 producers that responded to the number of animals they have during a year.

Table 3.3 shows the demographics of the respondents. Crop producers made up 67.86% of the survey respondents and 81.24% of respondents were male. The largest percentage of respondents were in the 55-69 year old age category with 44.56% of respondents. Respondents that had gross farm sales of $100,000-$499,999 accounted for

33.25% of respondents and only 5.41% of respondents had gross farm sales of $5,000,000 and over.

Table 3.1. Crop Producer Average Number of Acres Planted for Each Enterprise

	Mean	Standard Deviation
Corn	660	956
Soybeans	591	752
Wheat, Barley, Other Small Grains	775	1,423
Cotton	854	1,469
Potatoes	512	1,061
Tomatoes	202	489
Other Fruits, Nuts and Vegetables	499	1,570

Sample Size = 1,664 Producers

Table 3.2. Livestock Producer Average Number of Animals for Each Enterprise

	Mean	Standard Deviation
Cows Milked	519	1,027
Finished Pigs	10,686	21,216
Feeder Pigs	39,186	97,406
Finished Cattle	719	2,685
Feeder Cattle	580	5,247
Custom Cattle	1,075	4,667
Custom Heifers	372	1,678

Sample Size = 837 Producers

The sizes of the operations in this study are comparable to data gathered by the USDA through the 2007 census. According to the USDA, the midpoint acres of corn was 600, for cotton it was 1,090, soybeans was 490, and wheat was 910. The potato midpoint acres were 990 and tomatoes were 820. The average number of hogs was 30,000, dairy cattle was 570, fattened cattle was 35,000 and cattle less than five hundred pounds were 128 (Macdonald, Korb, and Hoppe 2013).

Table 3.3. Survey Respondent Demographics

	Percentage of Respondents
Producer Type	
Crop	67.86%
Livestock	32.14%
Gender	
Male	81.24%
Female	18.76%
Age	
18-39	4.89%
40-54	24.68%
55-69	44.56%
70+	25.88%
Gross Farm Sales	
less than $100,000	16.92%
$100,000 - $499,999	33.25%
$500,000 - $999,999	18.26%
$1,000,000 - $2,499,999	18.46%
$2,500,000 - $4,999,999	7.69%
$5,000,000 and over	5.41%
Takes Most of Their Time	
Managing Land, Equipment, and Facilities	44.39%
Managing Production	29.57%
Marketing/Prices	6.96%
Controlling Costs	9.15%
Managing People	7.69%
Other	2.24%
Hired Out Services	
Respondents that Hired out any services	79.78%
Dominant Strategy (Success Factor)	
Managing Land, Equipment, and Facilities	10.33%
Managing Production	20.13%
Marketing/Prices	6.29%
Controlling Costs	24.34%
Managing People	5.60%
Multiple Success Factors	33.32%

Table 3.3. Cont.

Role on Farm	
Primary farm decision maker	84.81%
Spouse of primary farm decision maker	10.53%
Other family employee	3.36%
Other non-family employee	1.30%

3.3 Methods

The methods used in this research include ordered logit modeling, multinomial logit modeling, factor analysis, and cluster analysis. The methods utilized will be explained in further detail in the following sections.

3.3.1 Ordered Logit and Multinomial Logit Models

The questions from the survey that are of interest in this study include the question that focused on the importance of various risks and the time spent managing parts of the operation (Appendix A questions 17 and 21). The survey question for risk included nine different risks that producers rated on a scale from 1 to 9 where 1 is "not at all important" and 9 is "very important." The nine types of risk are: fluctuations in the prices of things you buy for your farm; fluctuations in prices you receive for your production; fluctuations in yields; being too concentrated in one area of production; regulatory compliance; not having adequate land or physical resources; not having adequate skills, knowledge, or human resources; society's view of something happening on your farm; and competition. The survey also asked respondents to choose one activity from six categories that took most of their time in 2012. The six categories were:

managing land, equipment, and facilities; managing production; marketing/prices; controlling costs; managing people; and other. Both the perception of different risks and how producers spend most of their time could impact who producers do business with.

Willock and colleagues used a five-point Likert scale to evaluate farmers' attitudes in a 1999 survey of farmers (Willock et al. 1999). The Likert scales were used to measure farm attitude, objectives, and behaviors. Edwards-Jones created a survey that asked farmers to indicate their level of agreement with statements on a five-point scale ranging from "strongly disagree" to "strongly agree" (2006). The information from the questions was also broken down by the structure of the farm business. These two surveys use similar approaches to the questions asked in our survey and provide support for the chosen survey methods. In this research a nine-point Likert scale was used to allow for better differentiation amongst producers. Having a larger scale gives insight into the degree to which end of the scale producers fall. Though rating a risk as a 6 or as a 9 would put the risk on the "important" side of the scale, the producers' rating is quite different. One producer is close to risk neutral, while the other is more risk averse.

Ordered logit regression and multinomial logit regression analysis were used to estimate producer responses to the questions of interest and determine which factors were most likely to influence the responses. Logit models are traditionally used to examine economic choices that are discrete or either-or situations where one alternative or another must be chosen. These models can be extended to included choices between more than two alternatives or choices where the outcomes are ordered.

Ordered logit regression was chosen to analyze the question addressing the importance of various areas of risk. In a 2007 study, Torbett, Roberts, Larson, and

English used ordered logit regression to analyze a producer survey question determining producers' perceptions on the importance of precision farming that was on a Likert scale. Using this procedure they were able to determine which factors were most important to producers to increase P and K efficiency.

In a 2011 study focused on producers' risk perceptions, an ordered logit model was utilized. This research used an 11-point Likert scale to measure farmers' risk attitude. An ordered logit model was used to explain the association between the attitude on the Likert scale and the explanatory variables (Uematsu and Mishra 2011).

The ordered logit model is specified as:

$$w_{ij} = 1 \; if \; y_i \leq j, 0 \; otherwise, j = 1,2, \dots J - 1$$

$$Prob(w_{ij} = 1 | x_i) = F(x_i' \beta - \mu_j)$$

where β represents a common slope vector, μ is an error term, x_i represents any individuals own set of characteristics, i represents the individual and j represents the alternative, w_{ij} represents the probability that an individual will choose a specific alternative, and y_i represents the individual's actual alternative chosen (Greene 2012).

In this research the model is specified as:

$$w_{ij} = 1 \; if \; y_i \leq j, 0 \; otherwise, j = 1,2, \dots 8$$

$$Prob(w_{ij} = 1 | x_i) = F(x_i' \beta - \mu_j)$$

Here w is the probability that an individual will choose a specific alternative, each producer is represented by i from 1 to 1,897, and j represents their risk perception from 1 to 8 (J=9 in this study so J-1 is 8). x_i represents the individuals characteristics such as gross farm sales and gender. β represents a common slope vector, and μ is an error term.

Unlike the relatively easy interpretation of coefficients from linear statistical models, the coefficient estimates that result from logit models are not directly interpretable. Instead, the coefficient is weighted by the probability density function (PDF) of the logistic distribution (Griffiths, Hill, and Judge 1993). Because the value of the PDF is always positive, the sign of the coefficient indicates the direction of the marginal effect. The magnitude of the change in probability given a change in the respective variable is determined by the magnitude of the coefficient and PDF. In order to determine the marginal effect, or how a change in an explanatory variable affects the probability of an event occurring, the derivative must be taken (Griffiths, Hill, and Judge 1993). Throughout this study we will be interested in the marginal effects to offer insight into the factors that will make an event more or less probable. In a 2005 study, Alexander et al., used a multinomial logit model to predict market segments based on observable characteristics. The regression used characteristics that salespeople could easily determine about their customers or through simple questions. The model used assumed that producers have behavior that maximizes their utility. The model was significant at the 1% level and predicted the shares of the segments consistently with the actual shares.

D'Antoni, Mishra, and Joo used information from the 2009 Southern Precision Farming Survey and a multinomial logit model to determine how perceptions impact farmers adopting autosteer GPS guidance system (2012). A multinomial logit model was used to determine the probability of farmers adopting autosteer based on several demographic characteristics including age, education, and farm size. The farmers that

adopted autosteer were classified into three groups. It was found that several factors do increase the probability that a cotton farmer will adopt autosteer.

Multinomial logit models are appropriate when data are individual specific, like the data obtained in the 2013 Large Commercial Producer survey (Greene 2012). The dependent variables are categorical, with more than two categories, which is why multinomial logit is chosen to estimate.

The model equations determine the probabilities for the J + 1 choices for a respondent with the characteristic w_i. In the equation, i represents the individual and j represents the alternative chosen

$$Prob(Y_i = j|w_i) = \frac{e^{w'_i \alpha_j}}{\sum_{j=0}^{m} e^{w'_i \alpha_j}}, for\ j = 0, 1, \dots, m$$

(Greene 2012).

In this research, Y_i represents the probability that producer i chooses a particular alternative j, i represents each producer from 1 to 1,885, and j represents each of the six categories that producers could choose as taking most of their time. w_i represents the characteristics of each producer that are included in the model, and α_j represents the alternative that a producer chose.

$$Prob(Y_i = j|w_i) = \frac{e^{w'_i \alpha_j}}{\sum_{j=0}^{5} e^{w'_i \alpha_j}}, for\ j = 0, 1, \dots, 5$$

Table 3.4 shows all the variables that were included in the models and defines how they were included in the model. For the commodities, the number of acres or

number of head of animals were included. The hired out services variable was a dummy variable, so if they did hire out services they received a 1 and if not a zero. The hired services that were included for livestock producers were: fertilizer/manure application, reproduction services, feed and nutrition services, animal health and veterinary services. For crop producers the services included: fertilizer application, crop protection chemical application, seeding, and harvesting. For the dominant strategy, producers identified their most important success factor(s) by choosing the most important factor when paired against another factor. Each of the five factors were paired against each other factor, for a total of ten pairs. If the producer chose a factor four times, this was their dominant strategy. If they did not choose a factor four times, but chose one factor three times, then the factor chosen three times was the dominant strategy. If producers did not choose a factor four times nor chose one factor three times, they had multiple dominant strategies. Each strategy was created as a dummy variable. The respondents identified their role on the farm which were created as dummy variables. Age was in years and gross farm sales was in dollars. If the respondent was female, they received a 1 and if not a zero.

Table 3.4. Variables Defined

Variable	Input in Model
Corn and Soybeans	Acres
Wheat	Acres
Cotton	Acres
Fruits and Vegetables	Acres
Dairy Cows	Number of Head
Beef Cattle	Number of Head
Hogs	Humber of Head
Hired out Services	1/0
Dominant Strategy	
Managing Land, Equipment, and Facilities	1
Managing Production	1
Marketing/Prices	1
Controlling Costs	1
Managing People	1
Multiple Success Factors	1
Role on Farm	
Primary farm decision maker	1
Spouse of primary farm decision maker	1
Other family employee	1
Other non-family employee	1
Age	Years
Gross Farm Sales	Dollars
Gender	
Female	1

3.3.2 Factor Analysis and Clustering

For the cluster analysis, only the responses of producers that were the primary operators of the farm were included because the primary operators' responses may be different than another member of the operation. This reduced the sample size to 1,974. The cluster analysis was done using the risk question with all nine risks. Factor analysis

of all nine questions was done first, followed by the two-step hierarchical method to determine the number of clusters and then the k-means clustering method.

Factor analysis was conducted to determine if there were any risk variables that were redundant. The method used was similar to a 2012 study by Hansson and Lagerkvist, where factor analysis was used on survey questions that used Likert scales. Exploratory factor analysis was used to determine the underlying variables in their model. The factors that were insignificant were deleted. The factor solution was then rotated using an oblique rotation. Common factor analysis was applied to the questions and resulted in three factors that represented three benefit domains.

Meuwissen, Huirne, and Hardaker also used factor analysis to analyze Likert scale questions (2001). In the study, which was focused on risk and risk management for livestock farmers, factor analysis was followed by varimax orthogonal rotation and resulted in five factors. These methods were repeated in their study for the perceptions of risk management strategies.

Factor analysis is a method that is used to explain the relationships of a set of variables by determining underlying latent variables (DeVillis 1991). The procedure groups variables together that are highly correlated. If these variables are measuring similar characteristics, they can be condensed to be represented by one factor rather than multiple variables. Because our data includes several variables, it may be necessary to group these variables so we can decrease the total number of variables in the model.

The general factor analysis model is: for j=1 to p

$$X_j = b_{j1}F_1 + b_{j2}F_2 + \cdots + b_{ju}F_u$$

Where X_j represents the respondents value on principal component j. b_{ju}represents the factor weight for variable u, which was used to create principal component j. F_u represents the respondents' value on variable u and p represents the number of components (Nunnally and Bernstein 1994).

In a 2005 article, Alexander, Wilson, and Foley used a two-step method to segment buyers into 5 groups based on purchases. They first used a hierarchical algorithm, Ward's method, which determined the number of clusters appropriate for this data. This was followed by a non-hierarchical algorithm, k-means clustering that used the number of clusters found in the previous method. The same method was also used by Gloy and Akridge in a 1999 article segmenting producers for agricultural inputs.

A similar two-step approach is used in this study. The hierarchical method utilized is the two-step cluster algorithm. This approach is chosen because the data set is large and there is no research segmenting on the risk factors. This method determines the number of clusters appropriate for this data. This method is then followed by the non-hierarchical k-means clustering algorithm using the number of clusters that is found in the two-step cluster algorithm.

The two-step clustering algorithm works by first forming pre-clusters of the data using distance measures. After the pre-clusters are complete, all respondents in a cluster are treated as an entity. The standard hierarchical clustering algorithm is then used on the pre-clusters which explores a range of clusters (Verma 2013).

K-means clustering requires knowing the number of clusters in advance. This algorithm repeatedly reassigns respondents to clusters, which can move some respondents from group to group during the algorithm. The means for each of the

clusters is used to classify respondents based on their distance to the centers. This is repeated until the clusters are assigned to their final group (Verma 2013).

It is expected that from our results we will be able to identify characteristics of producers that affect their time allocations and how they rate the importance of different areas of risks, using information that retailers would be able to gather easily. This will allow retailers to better offer programs and services to specific groups of producers allowing them to be more profitable.

CHAPTER 4. RESULTS

4.1 Overview

This chapter presents the results from the ordered logit model, multinomial logit model, the principal component analysis and cluster analysis that were estimated by using the results from the 2013 Large Commercial Producer Survey. The results for the logit models were produced using STATA 12.1 and the results for the principal component analysis and cluster analysis were produced using IBM SPSS (version 21).

4.2 Ordered Logit Model

An ordered logit model was used to predict the likelihood of producers selecting the importance of each risk. In the Large Commercial Producer Survey, the risk question asked producers to rate risk on a scale from 1 to 9, where 1 means "not at all important" and 9 means "very important," for nine categories. The nine categories included: fluctuations in the prices of things you buy for your farm, fluctuations in prices you receive for your production, fluctuations in yields, being too concentrated in one area of production, regulatory compliance, not having adequate land or physical resources, not having adequate skills, knowledge, or human resources, society's view of something

happening on your farm, and competition. There were 1,897 respondents included in this model.

Table 4.1 shows the results from the ordered logit regression for producers rating the importance of the risk "fluctuations in the prices of things you buy for your farm" on the scale from 1 to 9. The coefficient estimates results indicated that managing land, equipment, and facilities, managing production, and gender were significant variables. The marginal effects showed managing land, equipment, and facilities, managing production and female as significant for all levels of importance, except 8, where they were not significant. The largest values for the marginal effects were observed for 9, "very important." At this level of importance, respondents who were female were 14.24% more likely to choose 9 than males. Females were 5.16% less likely to choose 7 compared to males and 2.82% less likely to choose 6. Producers that chose managing land, equipment, and facilities as their dominant strategy were 7.37% less likely to choose "fluctuations in the prices of things you buy for your farm" as a 9 or "very important" risk. Producers that selected managing production as their dominant strategy were 8.29% less likely to choose fluctuation in prices of things you buy as "very important."

Table 4.2 shows the results from the ordered logit regression for producers rating the risk of "fluctuations in the prices you receive for your production" on a scale from 1 to 9, where 1 means "not at all important" and 9 means "very important." The coefficient estimates indicated that the dominant strategies of output prices and managing land equipment and facilities, as well as gender and age were significant. The marginal effects showed female and age as significant for all levels of importance. The largest values for

the marginal effects were observed for 9, “very important.” At this level of importance, respondents who were female were 14.39% more likely to choose 9 than males. Females were 6.69% less likely to choose 8 compared to males and 3.63% less likely to choose 7. For every year older, producers were 0.22% more likely to choose 9. Producers that chose output prices as their dominant strategy were 13.47% more likely to choose “fluctuations in the prices you receive for your production” as a 9. Producers that chose managing land equipment and facilities as their dominant strategy were 7.31% less likely to choose “fluctuations in the prices you receive for your production” as a 9.

Table 4.1. Coefficient Estimates and Marginal Effects for the Importance of Fluctuations in the Prices of Things You Buy for Your Farm

Independent Variables	Coefficient Estimates	1	2	3	4	5	6	7	8	9
Dairy Cows (1,000 head)	0.1394 (0.1093)	-0.0014 (0.0011)	-0.0008 (0.0006)	-0.0012 (0.0010)	-0.0025 (0.0020)	-0.0082 (0.0064)	-0.0072 (0.0057)	-0.0116 (0.0092)	0.0003 (0.0007)	0.0326 (0.0256)
Hogs (1,000 head)	0.0026 (0.0030)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0001)	-0.0001 (0.0002)	-0.0001 (0.0002)	-0.0002 (0.0003)	0.0000 (0.0000)	0.0006 (0.0007)
Beef Cattle (1,000 head)	0.0180 (0.0213)	-0.0002 (0.0002)	-0.0001 (0.0001)	-0.0002 (0.0002)	-0.0003 (0.0004)	-0.0011 (0.0013)	-0.0009 (0.0011)	-0.0015 (0.0018)	0.0000 (0.0001)	0.0042 (0.005)
Corn and Soybeans (1,000 acres)	-0.0083 (0.0363)	0.0001 (0.0004)	0.0000 (0.0002)	0.0001 (0.0003)	0.0001 (0.0007)	0.0005 (0.0021)	0.0004 (0.0019)	0.0007 (0.0030)	0.0000 (0.0001)	-0.0019 (0.0085)
Wheat (1,000 acres)	0.0495 (0.0512)	-0.0005 (0.0005)	-0.0003 (0.0003)	-0.0004 (0.0005)	-0.0009 (0.0009)	-0.0029 (0.0030)	-0.0026 (0.0027)	-0.0041 (0.0043)	0.0001 (0.0003)	0.0116 (0.0120)
Cotton (1,000 acres)	0.0197 (0.1274)	-0.0002 (0.0013)	-0.0001 (0.0007)	-0.0002 (0.0011)	-0.0004 (0.0023)	-0.0012 (0.0075)	-0.0010 (0.0066)	-0.0016 (0.0106)	0.0000 (0.0003)	0.0046 (0.0298)
Fruits and Vegetables (1,000 acres)	0.0731 (0.0728)	-0.0007 (0.0008)	-0.0004 (0.0004)	-0.0006 (0.0007)	-0.0013 (0.0013)	-0.0043 (0.0043)	-0.0038 (0.0038)	-0.0061 (0.0061)	0.0002 (0.0004)	0.0171 (0.0170)
Hired Out Services	0.0567 (0.1121)	-0.0006 (0.0012)	-0.0003 (0.0006)	-0.0005 (0.0010)	-0.0010 (0.0021)	-0.0034 (0.0067)	-0.0030 (0.0059)	-0.0047 (0.0092)	0.0002 (0.0008)	0.0132 (0.0260)
Managing Land, Eqpt, and Facilities	-0.3277** (0.1526)	0.0037* (0.0021)	0.0020* (0.0012)	0.0032* (0.0019)	0.0066** (0.0036)	0.0209** (0.0106)	0.0177** (0.0086)	0.0252** (0.0106)	-0.005611 (0.0051)	-0.0737** (0.0329)
Managing Production	-0.3657*** (0.1177)	0.0041** (0.0017)	0.0022** (0.0010)	0.0035** (0.0015)	0.0072*** (0.0028)	0.0230*** (0.0081)	0.0196*** (0.0066)	0.0285*** (0.0086)	-0.0052 (0.0035)	-0.0829*** (0.0257)

Table 4.1. Cont.

Output Prices	-0.1454 (0.1797)	0.0016 (0.0021)	0.0008 (0.0011)	0.0013 (0.0018)	0.0028 (0.0036)	0.0089 (0.0115)	0.0077 (0.0097)	0.0117 (0.0140)	-0.0014 (0.0031)	-0.0334 (0.0406)
Controlling Costs	0.0312 (0.1122)	-0.0003 (0.0011)	-0.0002 (0.0006)	-0.0003 (0.0010)	-0.0006 (0.0020)	-0.0018 (0.0065)	-0.0016 (0.0058)	-0.0026 (0.0094)	0.0000 (0.0002)	0.0073 (0.0263)
Managing People	-0.2426 (0.1874)	0.0027 (0.0024)	0.0015 (0.0013)	0.0023 (0.0021)	0.0048 (0.0041)	0.0152 (0.0126)	0.0130 (0.0103)	0.0190 (0.0136)	-0.0035 (0.0051)	-0.0550 (0.0411)
Female	0.5883*** (0.1615)	-0.0049*** (0.0016)	-0.0027*** (0.0010)	-0.0043*** (0.0014)	-0.0090*** (0.0025)	-0.0301*** (0.0075)	-0.0282*** (0.0073)	-0.0516*** (0.0146)	-0.011628 (0.0071)	0.1424*** (0.0398)
Age	0.0040 (0.0035)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	-0.0001 (0.0001)	-0.0002 (0.0002)	-0.0002 (0.0002)	-0.0003 (0.0003)	0.0000 (0.0000)	0.0009 (0.0008)
Primary Farm Decision Maker	-0.4840 (0.4269)	0.0041 (0.0032)	0.0022 (0.0018)	0.0036 (0.0028)	0.0075 (0.0058)	0.0251 (0.0195)	0.0234 (0.0190)	0.0425 (0.0384)	0.0086 (0.0160)	-0.1171 (0.1054)
Spouse of Primary Farm Decisionmaker	-0.5987 (0.4580)	0.0077 (0.0077)	0.0041 (0.0042)	0.0066 (0.0065)	0.0133 (0.0126)	0.0410 (0.0358)	0.0327 (0.0255)	0.0411* (0.0227)	-0.0175 (0.0247)	-0.1292 (0.0892)
Other Family Employee	-0.6456 (0.4789)	0.0088 (0.0089)	0.0047 (0.0048)	0.0075 (0.0074)	0.0151 (0.0142)	0.0455 (0.0394)	0.0355 (0.0264)	0.0417** (0.0192)	-0.0224 (0.0304)	-0.1364 (0.0886)
Gross Farm Sales ($100,000s)	-0.0016 (0.0032)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0001)	0.0001 (0.0002)	0.0001 (0.0002)	0.0001 (0.0003)	0.0000 (0.0000)	-0.0004 (0.0008)

Note: Single, double, and triple asterisks (*) denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

Table 4.2. Coefficient Estimates and Marginal Effects for the Importance of Fluctuations in Prices You Receive for Your Production

Independent Variables	Coefficient Estimates	1	2	3	4	5	6	7	8	9
Dairy Cows (1,000 head)	0.0929 (0.1234)	-0.0012 (0.0016)	-0.0002 (0.0003)	-0.0003 (0.0004)	-0.0003 (0.0004)	-0.0027 (0.0036)	-0.0025 (0.0033)	-0.0060 (0.0080)	-0.0094 (0.0125)	0.0225 0.0299
Hogs (1,000 head)	-0.0013 (0.0029)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0001)	0.0000 (0.0001)	0.0001 (0.0002)	0.0001 (0.0003)	-0.0003 0.0007
Beef Cattle (1,000 head)	0.0145 (0.0239)	-0.0002 (0.0003)	0.0000 (0.0001)	0.0000 (0.0001)	0.0000 (0.0001)	-0.0004 (0.0007)	-0.0004 (0.0006)	-0.0009 (0.0015)	-0.0015 (0.0024)	0.0035 0.0058
Corn and Soybeans (1,000 acres)	-0.0327 (0.0354)	0.0004 (0.0005)	0.0001 (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)	0.0010 (0.0010)	0.0009 (0.0009)	0.0021 (0.0023)	0.0033 (0.0036)	-0.0079 0.0086
Wheat (1,000 acres)	0.0261 (0.0544)	-0.0003 (0.0007)	-0.0001 (0.0001)	-0.0001 (0.0002)	-0.0001 (0.0002)	-0.0008 (0.0016)	-0.0007 (0.0014)	-0.0017 (0.0035)	-0.0026 (0.0055)	0.0063 0.0132
Cotton (1,000 acres)	-0.0190 (0.1210)	0.0002 (0.0016)	0.0000 (0.0002)	0.0001 (0.0004)	0.0001 (0.0004)	0.0006 (0.0035)	0.0005 (0.0032)	0.0012 (0.0078)	0.0019 (0.0122)	-0.0046 0.0293
Fruits and Vegetables (1,000 acres)	0.1570 (0.1070)	-0.0020 (0.0014)	-0.0003 (0.0003)	-0.0005 (0.0004)	-0.0005 (0.0004)	-0.0046 (0.0032)	-0.0042 (0.0029)	-0.0101 (0.0069)	-0.0159 (0.0109)	0.0380 0.0259
Hired Out Services	0.1807 (0.1205)	-0.0025 (0.0018)	-0.0004 (0.0003)	-0.0007 (0.0005)	-0.0006 (0.0005)	-0.0055 (0.0039)	-0.0050 (0.0035)	-0.0120 (0.0082)	-0.0177 (0.0114)	0.0442 (0.0297)
Managing Land, Eqpt, and Facilities	-0.2968* (0.1640)	0.0043 (0.0028)	0.0007 (0.0005)	0.0011 (0.0008)	0.0010 (0.0007)	0.0096 (0.0059)	0.0085 (0.0052)	0.0201* (0.0117)	0.0277** (0.0140)	-0.0731* (0.0408)
Managing Production	-0.2003 (0.1278)	0.0027 (0.0019)	0.0004 (0.0004)	0.0007 (0.0006)	0.0006 (0.0005)	0.0061 (0.0042)	0.0055 (0.0037)	0.0133 (0.0087)	0.0195 (0.0120)	-0.0489 (0.0314)

Table 4.2. Cont.

Output Prices	0.5944*** (0.2213)	-0.0060*** (0.0021)	-0.0009* (0.0005)	-0.0016** (0.0008)	-0.0014** (0.0007)	-0.0139*** (0.0044)	-0.0130*** (0.0042)	-0.0335*** (0.0108)	-0.0642*** (0.0245)	0.1347*** (0.0457)
Controlling Costs	0.0163 (0.1211)	-0.0002 (0.0016)	0.0000 (0.0002)	-0.0001 (0.0004)	0.0000 (0.0004)	-0.0005 (0.0035)	-0.0004 (0.0032)	-0.0010 (0.0078)	-0.0016 (0.0123)	0.0039 (0.0293)
Managing People	-0.1432 (0.2013)	0.0020 (0.0030)	0.0003 (0.0005)	0.0005 (0.0008)	0.0004 (0.0007)	0.0044 (0.0065)	0.0040 (0.0058)	0.0095 (0.0137)	0.0139 (0.0188)	-0.0350 (0.0497)
Female	0.6270*** (0.1859)	-0.0067*** (0.0021)	-0.0010* (0.0006)	-0.0018** (0.0008)	-0.0015** (0.0007)	-0.0154*** (0.0042)	-0.0143*** (0.0040)	-0.0363*** (0.0098)	-0.0669*** (0.0204)	0.1439*** (0.0397)
Age	0.0090** (0.0038)	-0.0001** (0.0001)	0.0000 (0.0000)	0.0000* (0.0000)	0.0000* (0.0000)	-0.0003** (0.0001)	-0.0002** (0.0001)	-0.0006** (0.0003)	-0.0009** (0.0004)	0.0022** (0.0009)
Primary Farm Decision Maker	-0.3471 (0.4928)	0.0040 (0.0051)	0.0006 (0.0008)	0.0011 (0.0014)	0.0009 (0.0012)	0.0091 (0.0116)	0.0084 (0.0108)	0.0210 (0.0279)	0.0367 (0.0537)	-0.0817 (0.1120)
Spouse of Primary Farm Decisionmaker	-0.7778 (0.5251)	0.0140 (0.0131)	0.0021 (0.0022)	0.0036 (0.0035)	0.0031 (0.0030)	0.0298 (0.0257)	0.0255 (0.0207)	0.0555 (0.0393)	0.0583*** (0.0219)	-0.1920 (0.1271)
Other Family Employee	-0.5809 (0.5456)	0.0099 (0.0121)	0.0015 (0.0019)	0.0026 (0.0032)	0.0022 (0.0027)	0.0213 (0.0247)	0.0185 (0.0204)	0.0412 (0.0411)	0.0468 (0.0298)	-0.1440 (0.1348)
Gross Farm Sales ($100,000s)	0.0042 (0.0036)	-0.0001 (0.0001)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	-0.0001 (0.0001)	-0.0001 (0.0001)	-0.0003 (0.0002)	-0.0004 (0.0004)	0.0010 0.0009

Note: Single, double, and triple asterisks (*) denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

Table 4.3 shows the results from the ordered logit regression for producers rating the importance of "fluctuations in yields" on a scale from 1 to 9. The coefficient estimates showed that fruits, nuts, and vegetables, dairy cows, gender, age, and role on the farm were significant. The marginal effects indicated that fruits, nuts, and vegetables and dairy cows were significant for all levels of importance. As the acres of fruits, nuts, and vegetables increased by 1,000 acres, producers were 3.83% more likely to choose 9, "very important." As the number of dairy cows increased by 1,000 head, producers were 6.25% more likely to choose 9. The marginal effects showed female and age as significant for all levels of importance. The largest values for the marginal effects were for importance level 9. Respondents who were female were 13.01% more likely to choose 9 than males. Females were 4.49% less likely to choose 7 compared to males and 2.50% less likely to choose 6. For every year older, producers were 0.26% more likely to choose 9. Primary farm decision makers were 19.33% less likely to rate this risk as a 9 compared to the base which was other non-family employee and other family employees were 21.00% less likely to rate this risk as a 9 compared to non-family employees.

Table 4.4 shows the results from the ordered logit regression for producers rating the risk of "being too concentrated in one area of production" on a scale from 1 to 9. The coefficient estimates showed the variable for primary farm decision maker was significant. The marginal effects indicated that primary farm decision maker was significant for all the ratings, except 9. Primary farm decision makers are 3.06% more likely to rate this risk as a 1 than other non-family employees.

Table 4.3. Coefficient Estimates and Marginal Effects for the Importance of Fluctuations in Yields

Independent Variables	Coefficient Estimates	1	2	3	4	5	6	7	8	9
Dairy Cows (1,000 head)	0.2547*	-0.0032*	-0.0009	-0.0020*	-0.0027*	-0.0130*	-0.0133*	-0.0216*	-0.0059*	0.0625*
	(0.1396)	(0.0019)	(0.0006)	(0.0012)	(0.0016)	(0.0072)	(0.0073)	(0.0119)	(0.0035)	(0.0343)
Hogs (1,000 head)	-0.0003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0001
	(0.0028)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0002)	(0.0002)	(0.0001)	(0.0007)
Beef Cattle (1,000 head)	0.0202	-0.0003	-0.0001	-0.0002	-0.0002	-0.0010	-0.0010	-0.0017	-0.0005	0.0049
	(0.0228)	(0.0003)	(0.0001)	(0.0002)	(0.0002)	(0.0012)	(0.0012)	(0.0019)	(0.0005)	(0.0056)
Corn and Soybeans (1,000 acres)	0.0178	-0.0002	-0.0001	-0.0001	-0.0002	-0.0009	-0.0009	-0.0015	-0.0004	0.0044
	(0.0348)	(0.0004)	(0.0001)	(0.0003)	(0.0004)	(0.0018)	(0.0018)	(0.0030)	(0.0008)	(0.0086)
Wheat (1,000 acres)	0.0167	-0.0002	-0.0001	-0.0001	-0.0002	-0.0009	-0.0009	-0.0014	-0.0004	0.0041
	(0.0508)	(0.0006)	(0.0002)	(0.0004)	(0.0005)	(0.0026)	(0.0027)	(0.0043)	(0.0012)	(0.0125)
Cotton (1,000 acres)	0.0826	-0.0010	-0.0003	-0.0006	-0.0009	-0.0042	-0.0043	-0.0070	-0.0019	0.0203
	(0.1254)	(0.0016)	(0.0005)	(0.001)	(0.0013)	(0.0064)	(0.0065)	(0.0107)	(0.0029)	(0.0308)
Fruits and Vegetables (1,000 acres)	0.1562*	-0.0020*	-0.0005*	-0.0012*	-0.0016*	-0.0079*	-0.0081*	-0.0133*	-0.0036*	0.0383*
	(0.0845)	(0.0011)	(0.0004)	(0.0007)	(0.001)	(0.0043)	(0.0044)	(0.0072)	(0.0021)	(0.0207)
Hired Out Services	-0.1303	0.0016	0.0004	0.0010	0.0013	0.0064	0.0067	0.0111	0.0036	-0.0321
	(0.1147)	(0.0014)	(0.0004)	(0.0009)	(0.0012)	(0.0055)	(0.0058)	(0.0099)	(0.0037)	(0.0284)
Managing Land, Eqpt, and Facilities	-0.1852	0.0025	0.0007	0.0016	0.0021	0.0099	0.0100	0.0154	0.0028**	-0.0449
	(0.1568)	(0.0023)	(0.0007)	(0.0015)	(0.0019)	(0.0089)	(0.0087)	(0.0127)	(0.0014)	(0.0375)
Managing Production	0.0725	-0.0009	-0.0002	-0.0006	-0.0008	-0.0036	-0.0037	-0.0062	-0.0018	0.0178
	(0.1203)	(0.0015)	(0.0004)	(0.0009)	(0.0012)	(0.0059)	(0.0062)	(0.0103)	(0.0033)	(0.0297)

Table 4.3. Cont.

Output Prices	0.1562	-0.0018	-0.0005	-0.0011	-0.0016	-0.0076	-0.0079	-0.0134	-0.0047	0.0386
	(0.1841)	(0.0021)	(0.0006)	(0.0013)	(0.0018)	(0.0085)	(0.0090)	(0.0159)	(0.0069)	(0.0458)
Controlling Costs	-0.0431	0.0005	0.0002	0.0003	0.0005	0.0022	0.0023	0.0036	0.0010	-0.0106
	(0.1141)	(0.0015)	(0.0004)	(0.0009)	(0.0012)	(0.0059)	(0.006)	(0.0096)	(0.0024)	(0.0279)
Managing People	-0.1863	0.0025	0.0007	0.0016	0.0021	0.0101	0.0100	0.0154	0.0027**	-0.0451
	(0.1881)	(0.0028)	(0.0008)	(0.0018)	(0.0023)	(0.0108)	(0.0105)	(0.0152)	(0.0013)	(0.0448)
Female	0.5246***	-0.0056***	-0.0016**	-0.0035***	-0.0048***	-0.0234***	-0.0250***	-0.0449***	-0.0213**	0.1301***
	(0.1701)	(0.0019)	(0.0007)	(0.0013)	(0.0017)	(0.0069)	(0.0076)	(0.0145)	(0.0099)	(0.0421)
Age	0.0105***	-0.0001**	0.0000*	-0.0001**	-0.0001**	-0.0005***	-0.0005***	-0.0009***	-0.0002**	0.0026***
	(0.0035)	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0002)	(0.0002)	(0.0003)	(0.0001)	(0.0009)
Primary Farm Decision Maker	-0.7832*	0.0076**	0.0021*	0.0048**	0.0065**	0.0322**	0.0351**	0.0661*	0.0390	-0.1933*
	(0.4444)	(0.0036)	(0.0012)	(0.0024)	(0.0032)	(0.0147)	(0.0168)	(0.0354)	(0.0315)	(0.1066)
Spouse of Primary Farm Decisionmaker	-0.8200*	0.0147	0.0040	0.0089	0.0118	0.0527	0.0470*	0.0572**	-0.0113	-0.1850*
	(0.4783)	(0.0121)	(0.0035)	(0.0072)	(0.0093)	(0.0374)	(0.0285)	(0.0224)	(0.0232)	(0.0952)
Other Family Employee	-0.9673*	0.0195	0.0052	0.0116	0.0153	0.0664	0.0560*	0.0600***	-0.0240	-0.2100**
	(0.4991)	(0.0155)	(0.0044)	(0.0091)	(0.0114)	(0.0430)	(0.0287)	(0.0138)	(0.0333)	(0.0896)
Gross Farm Sales ($100,000s)	-0.0016	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0000	-0.0004
	(0.0032)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0002)	(0.0002)	(0.0003)	(0.0001)	(0.0008)

Note: Single, double, and triple asterisks (*) denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

Table 4.4. Coefficient Estimates and Marginal Effects for the Importance of Being too Concentrated in One Area of Production

Independent Variables	Coefficient Estimates	1	2	3	4	5	6	7	8	9
Dairy Cows (1,000 head)	0.0261	-0.0012	-0.0009	-0.0012	-0.0012	-0.0020	0.0000	0.0016	0.0020	0.0028
	(0.0984)	(0.0045)	(0.0033)	(0.0044)	(0.0044)	(0.0074)	(0.0002)	(0.0060)	(0.0076)	(0.0105)
Hogs (1,000 head)	0.0044	-0.0002	-0.0001	-0.0002	-0.0002	-0.0003	0.0000	0.0003	0.0003	0.0005
	(0.0028)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0000)	(0.0002)	(0.0002)	(0.0003)
Beef Cattle (1,000 head)	-0.0084	0.0004	0.0003	0.0004	0.0004	0.0006	0.0000	-0.0005	-0.0007	-0.0009
	(0.0171)	(0.0008)	(0.0006)	(0.0008)	(0.0008)	(0.0013)	(0.0000)	(0.0010)	(0.0013)	(0.0018)
Corn and Soybeans (1,000 acres)	-0.0309	0.0014	0.0010	0.0014	0.0014	0.0023	0.0000	-0.0019	-0.0024	-0.0033
	(0.0339)	(0.0016)	(0.0011)	(0.0015)	(0.0015)	(0.0026)	(0.0001)	(0.0021)	(0.0026)	(0.0036)
Wheat (1,000 acres)	0.0286	-0.0013	-0.0010	-0.0013	-0.0013	-0.0022	0.0000	0.0017	0.0022	0.0031
	(0.0472)	(0.0022)	(0.0016)	(0.0021)	(0.0021)	(0.0036)	(0.0001)	(0.0029)	(0.0037)	(0.0051)
Cotton (1,000 acres)	-0.0096	0.0004	0.0003	0.0004	0.0004	0.0007	0.0000	-0.0006	-0.0007	-0.0010
	(0.1255)	(0.0057)	(0.0042)	(0.0056)	(0.0056)	(0.0095)	(0.0002)	(0.0076)	(0.0097)	(0.0134)
Fruits and Vegetables (1,000 acres)	0.0335	-0.0015	-0.0011	-0.0015	-0.0015	-0.0025	0.0000	0.0020	0.0026	0.0036
	(0.0527)	(0.0024)	(0.0018)	(0.0024)	(0.0024)	(0.0040)	(0.0001)	(0.0032)	(0.0041)	(0.0057)
Hired Out Services	0.0857	-0.0040	-0.0029	-0.0039	-0.0039	-0.0063	0.0000	0.0053	0.0066	0.0090
	(0.1098)	(0.0053)	(0.0038)	(0.0050)	(0.0050)	(0.0079)	(0.0004)	(0.0070)	(0.0084)	(0.0113)
Managing Land, Eqpt, and Facilities	-0.0365	0.0017	0.0012	0.0016	0.0016	0.0027	0.0000	-0.0023	-0.0028	-0.0039
	(0.1477)	(0.0069)	(0.0050)	(0.0067)	(0.0067)	(0.0109)	(0.0002)	(0.0092)	(0.0114)	(0.0155)
Managing Production	-0.1449	0.0069	0.0050	0.0066	0.0065	0.0106	-0.0002	-0.0091	-0.0111	-0.0150
	(0.1162)	(0.0058)	(0.0042)	(0.0054)	(0.0053)	(0.0082)	(0.0007)	(0.0076)	(0.0089)	(0.0117)

Table 4.4. Cont.

Output Prices	-0.2559 (0.1767)	0.0129 (0.0099)	0.0092 (0.0070)	0.0120 (0.0087)	0.0116 (0.0081)	0.0174 (0.0106)	-0.0017 (0.0026)	-0.0171 (0.0127)	-0.0193 (0.0130)	-0.0252 (0.0160)
Controlling Costs	-0.1228 (0.1089)	0.0058 (0.0053)	0.0042 (0.0038)	0.0055 (0.0050)	0.0055 (0.0049)	0.0091 (0.0079)	-0.0001 (0.0005)	-0.0077 (0.0070)	-0.0095 (0.0084)	-0.0129 (0.0112)
Managing People	0.0272 (0.1882)	-0.0012 (0.0084)	-0.0009 (0.0062)	-0.0012 (0.0083)	-0.0012 (0.0084)	-0.0021 (0.0145)	-0.0001 (0.0006)	0.0016 (0.0112)	0.0021 (0.0147)	0.0029 (0.0205)
Female	-0.1845 (0.1628)	0.0089 (0.0084)	0.0064 (0.0060)	0.0085 (0.0077)	0.0083 (0.0075)	0.0132 (0.0110)	-0.0006 (0.0014)	-0.0119 (0.0110)	-0.0141 (0.0123)	-0.0188 (0.0159)
Age	-0.0014 (0.0034)	0.0001 (0.0002)	0.0000 (0.0001)	0.0001 (0.0002)	0.0001 (0.0002)	0.0001 (0.0003)	0.0000 (0.0000)	-0.0001 (0.0002)	-0.0001 (0.0003)	-0.0001 (0.0004)
Primary Farm Decision Maker	-0.8828* (0.4541)	0.0306** (0.0121)	0.0233** (0.0095)	0.0325** (0.0137)	0.0354** (0.0157)	0.0755* (0.0397)	0.019787 (0.0182)	-0.0299*** (0.0040)	-0.0667** (0.0304)	-0.12035 (0.0761)
Spouse of Primary Farm Decisionmaker	-0.3279 (0.4816)	0.0170 (0.0281)	0.0121 (0.0194)	0.0155 (0.0241)	0.0149 (0.0219)	0.0217 (0.0268)	-0.0027 (0.0084)	-0.0222 (0.0353)	-0.0246 (0.0347)	-0.0317 (0.0418)
Other Family Employee	-0.5149 (0.5021)	0.0294 (0.0352)	0.0203 (0.0230)	0.0254 (0.0267)	0.0233 (0.0221)	0.0295 (0.0180)	-0.0078 (0.0154)	-0.0368 (0.0394)	-0.0373 (0.0332)	-0.0459 (0.0367)
Gross Farm Sales ($100,000s)	-0.0021 (0.0032)	0.0001 (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)	0.0002 (0.0002)	0.0000 (0.0000)	-0.0001 (0.0002)	-0.0002 (0.0002)	-0.0002 (0.0003)

Note: Single, double, and triple asterisks (*) denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

Table 4.5 shows the results from the ordered logit regression for producers rating the risk of "regulatory compliance" on a scale from 1 to 9. The coefficient estimates indicated that dairy cows, managing people, female, age, and gross farm sales were significant. The marginal effects showed that dairy cows, age, and gross farm sales were significant in all the levels of importance, except 7. As the number of dairy cows increased by 1,000 head, producers were 5.32% more likely to choose 9, "very important." Females were 5.63% more likely to choose 9 than males. The largest values for the marginal effects for age and gross farm sales were at importance level 9. For every year older, producers were 0.19% more likely to choose 9. For every $100,000 increase in gross farm sales, producers were 0.16% more likely to choose 9. Producers that chose managing people as their dominant strategy were 13.85% more likely to choose the importance of regulatory compliance as a 9.

Table 4.6 shows the results from the ordered logit regression for producers rating the risk of "not having adequate land or physical resources" on a scale from 1 to 9. The coefficient estimates showed that beef cattle, hired out services, output prices, and age were significant. The marginal effects indicated that beef cattle producers were 1.04% more likely to choose this risk as "very important". Producers who hired out services were 3.92% more likely to choose 9, "very important." They were 1.67% more likely to choose 8 and 1.6% less likely to choose 1. Age was significant for all levels of importance, except 7. For every year older, producers were 0.27% less likely to choose 9 and 0.10% more likely to choose 1. Producer that chose output prices as their dominant strategy were 6.01% less likely to choose this risk as a 9 compared to the group that had multiple dominant strategies.

Table 4.5. Coefficient Estimates and Marginal Effects for the Importance of Regulatory Compliance

Independent Variables	Coefficient Estimates	1	2	3	4	5	6	7	8	9
Dairy Cows (1,000 head)	0.2835** (0.1122)	-0.0090** (0.0037)	-0.0056** (0.0024)	-0.0110** (0.0045)	-0.0113** (0.0046)	-0.0233** (0.0093)	-0.0088** (0.0036)	-0.0002 (0.0010)	0.0160** (0.0065)	0.0532** (0.0211)
Hogs (1,000 head)	0.0016 (0.0028)	-0.0001 (0.0001)	0.0000 (0.0001)	-0.0001 (0.0001)	-0.0001 (0.0001)	-0.0001 (0.0002)	0.0000 (0.0001)	0.0000 (0.0000)	0.0001 (0.0002)	0.0003 (0.0005)
Beef Cattle (1,000 head)	-0.0102 (0.0144)	0.0003 (0.0005)	0.0002 (0.0003)	0.0004 (0.0006)	0.0004 (0.0006)	0.0008 (0.0012)	0.0003 (0.0004)	0.0000 (0.0000)	-0.0006 (0.0008)	-0.0019 (0.0027)
Corn and Soybeans (1,000 acres)	-0.0083 (0.0333)	0.0003 (0.0011)	0.0002 (0.0007)	0.0003 (0.0013)	0.0003 (0.0013)	0.0007 (0.0027)	0.0003 (0.001)	0.0000 (0.0000)	-0.0005 (0.0019)	-0.0016 (0.0062)
Wheat (1,000 acres)	-0.0019 (0.0479)	0.0001 (0.0015)	0.0000 (0.0010)	0.0001 (0.0019)	0.0001 (0.0019)	0.0002 (0.0039)	0.0001 (0.0015)	0.0000 (0.0000)	-0.0001 (0.0027)	-0.0003 (0.0090)
Cotton (1,000 acres)	-0.0616 (0.1143)	0.0020 (0.0036)	0.0012 (0.0023)	0.0024 (0.0045)	0.0025 (0.0046)	0.0051 (0.0094)	0.0019 (0.0035)	0.0000 (0.0002)	-0.0035 (0.0065)	-0.0116 (0.0215)
Fruits and Vegetables (1,000 acres)	0.0000 (0.0582)	0.0000 (0.0019)	0.0000 (0.0012)	0.0000 (0.0023)	0.0000 (0.0023)	0.0000 (0.0048)	0.0000 (0.0018)	0.0000 (0.0000)	0.0000 (0.0033)	0.0000 (0.0109)
Hired Out Services	-0.0610 (0.1096)	0.0019 (0.0034)	0.0012 (0.0021)	0.0023 (0.0042)	0.0024 (0.0043)	0.0050 (0.0091)	0.0019 (0.0036)	0.0001 (0.0005)	-0.0034 (0.0060)	-0.0116 (0.0210)
Managing Land, Eqpt, and Facilities	-0.2184 (0.1502)	0.0076 (0.0057)	0.0046 (0.0035)	0.0090 (0.0066)	0.0090 (0.0065)	0.0177 (0.0120)	0.0059* (0.0035)	-0.0013 (0.0020)	-0.0133 (0.0098)	-0.0392 (0.0257)
Managing Production	-0.1248 (0.1172)	0.0041 (0.0040)	0.0025 (0.0025)	0.0050 (0.0048)	0.0050 (0.0048)	0.0102 (0.0096)	0.0036 (0.0033)	-0.0003 (0.0007)	-0.0073 (0.0071)	-0.0230 (0.0212)

Table 4.5. Cont.

Output Prices	-0.2232 (0.1734)	0.0078 (0.0067)	0.0048 (0.0041)	0.0093 (0.0077)	0.0092 (0.0075)	0.0181 (0.0137)	0.0059 (0.0038)	-0.0015 (0.0025)	-0.0137 (0.0114)	-0.0398 (0.0294)
Controlling Costs	0.0440 (0.1094)	-0.0014 (0.0034)	-0.0009 (0.0021)	-0.0017 (0.0042)	-0.0017 (0.0043)	-0.0036 (0.0090)	-0.0014 (0.0035)	-0.0001 (0.0003)	0.0025 (0.0060)	0.0083 (0.0208)
Managing People	0.6529*** (0.1856)	-0.0161*** (0.0039)	-0.0102*** (0.0027)	-0.0208*** (0.0051)	-0.0224*** (0.0057)	-0.0524*** (0.0142)	-0.0260*** (0.0086)	-0.0140* (0.0076)	0.0233*** (0.0035)	0.1385*** (0.0432)
Female	0.2862* (0.163)	-0.0083* (0.0044)	-0.0052* (0.0028)	-0.0104* (0.0056)	-0.0109* (0.0060)	-0.0236* (0.0134)	-0.0099 (0.0063)	-0.0023 (0.0027)	0.0144** (0.0072)	0.0563* (0.0335)
Age	0.0100*** (0.0034)	-0.0003*** (0.0001)	-0.0002*** (0.0001)	-0.0004*** (0.0001)	-0.0004*** (0.0001)	-0.0008*** (0.0003)	-0.0003*** (0.0001)	0.0000 (0.0000)	0.0006*** (0.0002)	0.0019*** (0.0006)
Primary Farm Decision Maker	-0.5546 (0.4341)	0.0147 (0.0097)	0.0093 (0.0063)	0.0187 (0.0127)	0.0199 (0.0139)	0.0451 (0.0340)	0.0209 (0.0186)	0.0088 (0.0131)	-0.0233** (0.0112)	-0.1141 (0.0964)
Spouse of Primary Farm Decisionmaker	-0.5735 (0.4651)	0.0230 (0.0232)	0.0138 (0.0135)	0.0260 (0.0241)	0.0248 (0.0213)	0.0438 (0.0310)	0.0108*** (0.0030)	-0.0096 (0.0153)	-0.0379 (0.0335)	-0.0947 (0.0664)
Other Family Employee	-0.4640 (0.4855)	0.0182 (0.0231)	0.0109 (0.0135)	0.0208 (0.0246)	0.0200 (0.0222)	0.0360 (0.0338)	0.0093** (0.0042)	-0.0071 (0.0149)	-0.0305 (0.035)	-0.0775 (0.0711)
Gross Farm Sales ($100,000s)	0.0087*** (0.0032)	-0.0003** (0.0001)	-0.0002*** (0.0001)	-0.0003*** (0.0001)	-0.0003*** (0.0001)	-0.0007*** (0.0003)	-0.0003*** (0.0001)	0.0000 (0.0000)	0.0005*** (0.0002)	0.0016*** (0.0006)

Note: Single, double, and triple asterisks (*) denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

Table 4.6. Coefficient Estimates and Marginal Effects for the Importance of Not having Adequate Land or Physical Resources

Independent Variables	Coefficient Estimates	1	2	3	4	5	6	7	8	9
Dairy Cows (1,000 head)	-0.0512 (0.1348)	0.0033 (0.0087)	0.0015 (0.004)	0.0019 (0.0051)	0.0016 (0.0042)	0.0032 (0.0084)	0.0010 (0.0026)	-0.0003 (0.0009)	-0.0034 (0.0091)	-0.0088 (0.0232)
Hogs (1,000 head)	-0.0031 (0.0028)	0.0002 (0.0002)	0.0001 (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)	0.0002 (0.0002)	0.0001 (0.0001)	0.0000 (0.)	-0.0002 (0.0002)	-0.0005 (0.0005)
Beef Cattle (1,000 head)	0.0607* (0.0346)	-0.0039* (0.0023)	-0.0018* (0.0011)	-0.0023* (0.0013)	-0.0019* (0.0011)	-0.0038* (0.0022)	-0.0012* (0.0007)	0.0004 (0.0003)	0.0041* (0.0023)	0.0104* (0.006)
Corn and Soybeans (1,000 acres)	0.0455 (0.0336)	-0.0029 (0.0022)	-0.0014 (0.001)	-0.0017 (0.0013)	-0.0014 (0.0011)	-0.0028 (0.0021)	-0.0009 (0.0007)	0.0003 (0.0003)	0.0031 (0.0023)	0.0078 (0.0058)
Wheat (1,000 acres)	0.0306 (0.053)	-0.0020 (0.0034)	-0.0009 (0.0016)	-0.0012 (0.002)	-0.0010 (0.0017)	-0.0019 (0.0033)	-0.0006 (0.001)	0.0002 (0.0004)	0.0021 (0.0036)	0.0053 (0.0091)
Cotton (1,000 acres)	-0.0497 (0.1128)	0.0032 (0.0073)	0.0015 (0.0034)	0.0019 (0.0043)	0.0015 (0.0035)	0.0031 (0.0071)	0.0010 (0.0022)	-0.0003 (0.0007)	-0.0033 (0.0076)	-0.0085 (0.0194)
Fruits and Vegetables (1,000 acres)	-0.0798 (0.0665)	0.0051 (0.0043)	0.0024 (0.002)	0.0030 (0.0025)	0.0025 (0.0021)	0.0050 (0.0042)	0.0016 (0.0013)	-0.0005 (0.0005)	-0.0054 (0.0045)	-0.0137 (0.0114)
Hired Out Services	0.2383** (0.1111)	-0.0164** (0.0083)	-0.0075** (0.0037)	-0.0093** (0.0045)	-0.0075** (0.0036)	-0.0143** (0.0065)	-0.0040** (0.0016)	0.0030 (0.0023)	0.0167** (0.0081)	0.0392** (0.0175)
Managing Land, Eqpt, and Facilities	-0.0942 (0.1535)	0.0063 (0.0106)	0.0029 (0.0048)	0.0036 (0.006)	0.0029 (0.0048)	0.0058 (0.0093)	0.0017 (0.0026)	-0.0009 (0.002)	-0.0065 (0.0108)	-0.0158 (0.0253)
Managing Production	-0.0860 (0.1154)	0.0057 (0.0078)	0.0026 (0.0036)	0.0033 (0.0045)	0.0027 (0.0036)	0.0053 (0.0071)	0.0016 (0.0021)	-0.0007 (0.0012)	-0.0059 (0.008)	-0.0146 (0.0193)

Table 4.6. Cont.

Output Prices	-0.3860**	0.0288*	0.0128**	0.0155**	0.0121**	0.0218**	0.0049***	-0.00768	-0.0281**	-0.0601**
	(0.1746)	(0.0151)	(0.0065)	(0.0075)	(0.0056)	(0.0087)	(0.0013)	(0.0059)	(0.0135)	(0.0245)
Controlling Costs	0.0571	-0.0036	-0.0017	-0.0021	-0.0018	-0.0036	-0.0011	0.0003	0.0038	0.0099
	(0.1102)	(0.007)	(0.0032)	(0.0041)	(0.0034)	(0.007)	(0.0023)	(0.0005)	(0.0073)	(0.0192)
Managing People	0.2242	-0.0133	-0.0063	-0.0081	-0.0068	-0.0144	-0.0051	-0.0005	0.0139	0.0406
	(0.1829)	(0.01)	(0.0049)	(0.0063)	(0.0055)	(0.0121)	(0.0048)	(0.0021)	(0.0103)	(0.0348)
Female	0.1198	-0.0075	-0.0035	-0.0044	-0.0037	-0.0076	-0.0025	0.0003	0.0078	0.0210
	(0.1705)	(0.0103)	(0.0049)	(0.0062)	(0.0052)	(0.011)	(0.0038)	(0.0005)	(0.0108)	(0.0306)
Age	-0.0156***	0.0010***	0.0005***	0.0006***	0.0005***	0.0010***	0.0003***	-0.0001	-0.0010***	-0.0027***
	(0.0035)	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0001)	(0.0001)	(0.0003)	(0.0006)
Primary Farm Decision Maker	-0.2044	0.0124	0.0058	0.0074	0.0063	0.0131	0.0045	0.0000	-0.0129	-0.0366
	(0.4184)	(0.0237)	(0.0113)	(0.0147)	(0.0126)	(0.0273)	(0.0103)	(0.0029)	(0.0247)	(0.0779)
Spouse of Primary Farm Decisionmaker	-0.1603	0.0110	0.0050	0.0062	0.0050	0.0097	0.0027	-0.0019	-0.0112	-0.0265
	(0.4465)	(0.0323)	(0.0145)	(0.0177)	(0.0141)	(0.026)	(0.0064)	(0.0077)	(0.0323)	(0.0710)
Other Family Employee	0.0941	-0.0058	-0.0027	-0.0035	-0.0029	-0.0060	-0.0020	0.0002	0.0061	0.0166
	(0.4751)	(0.0284)	(0.0134)	(0.0172)	(0.0145)	(0.0306)	(0.0107)	(0.0007)	(0.0298)	(0.0856)
Gross Farm Sales ($100,000s)	-0.0006	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0001
	(0.0032)	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0001)	(0.0000)	(0.0002)	(0.0005)

Note: Single, double, and triple asterisks (*) denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

Table 4.7 shows the results from the ordered logit regression for producers rating the risk of "not having adequate skills, knowledge, or human resources" on a scale from 1 to 9. The coefficient estimates indicated that hired out services, managing production, and female were significant. The marginal effects indicated that hired out services and managing production were significant at all levels of importance, except 6. Producers that hired out services were 2.47% more likely to choose 9 and 1.41% less likely to choose 1. Females were 1.84% more likely to choose 8 than males and 1.65% less likely to choose 1. Respondents that had managing production as their dominant strategy were 2.60% less likely to choose 9 and 1.48% more likely to choose 1.

Table 4.8 shows the results from the ordered logit regression for producers rating the risk of "society's view of something happening on your farm" on a scale from 1 to 9. The coefficient estimates indicated that fruits, nuts, and vegetables, dairy cows, hired out services, managing land, equipment and facilities, output prices, and managing people were significant. The marginal effects showed that fruits, nuts, and vegetables and dairy cows were significant at all levels of importance. As the acres of fruits, nuts, and vegetables increased by 1,000 acres, producers were 1.89% less likely to choose 9. As the number of dairy cows increased by 1,000 head, producers were 3.83% more likely to choose 9 and 2.50% less likely to choose 1. Producers that hired out services were 3.48% more likely to choose 9 and 2.54% less likely to choose 1. Producers that chose managing land, equipment, and facilities were 3.95% less likely to choose 9. Producers that chose output prices were 6.45% less likely to choose 9, while producers that chose managing people were 15.28% more likely to choose 9.

Table 4.7. Coefficient Estimates and Marginal Effects for the Importance of Not having Adequate Skills, Knowledge, or Human Resources

Independent Variables	Coefficient Estimates	1	2	3	4	5	6	7	8	9
Dairy Cows (1,000 head)	0.0954 (0.1139)	-0.0063 (0.0076)	-0.0043 (0.0052)	-0.0056 (0.0068)	-0.0033 (0.0040)	-0.0040 (0.0048)	0.0003 (0.0004)	0.0045 (0.0054)	0.0066 (0.0079)	0.0122 (0.0146)
Hogs (1,000 head)	-0.0026 (0.0029)	0.0002 (0.0002)	0.0001 (0.0001)	0.0002 (0.0002)	0.0001 (0.0001)	0.0001 (0.0001)	0.0000 (0.0000)	-0.0001 (0.0001)	-0.0002 (0.0002)	-0.0003 (0.0004)
Beef Cattle (1,000 head)	0.0110 (0.0132)	-0.0007 (0.0009)	-0.0005 (0.0006)	-0.0007 (0.0008)	-0.0004 (0.0005)	-0.0005 (0.0006)	0.0000 (0.0001)	0.0005 (0.0006)	0.0008 (0.0009)	0.0014 (0.0017)
Corn and Soybeans (1,000 acres)	-0.0481 (0.0323)	0.0032 (0.0022)	0.0022 (0.0015)	0.0028 (0.0019)	0.0017 (0.0011)	0.0020 (0.0014)	-0.0001 (0.0002)	-0.0023 (0.0016)	-0.0033 (0.0022)	-0.0062 (0.0042)
Wheat (1,000 acres)	0.0391 (0.0499)	-0.0026 (0.0033)	-0.0018 (0.0023)	-0.0023 (0.0030)	-0.0014 (0.0018)	-0.0017 (0.0021)	0.0001 (0.0002)	0.0019 (0.0024)	0.0027 (0.0035)	0.0050 (0.0064)
Cotton (1,000 acres)	0.0070 (0.1084)	-0.0005 (0.0072)	-0.0003 (0.0049)	-0.0004 (0.0064)	-0.0002 (0.0038)	-0.0003 (0.0046)	0.0000 (0.0003)	0.0003 (0.0052)	0.0005 (0.0075)	0.0009 (0.0139)
Fruits and Vegetables (1,000 acres)	0.0071 (0.0620)	-0.0005 (0.0041)	-0.0003 (0.0028)	-0.0004 (0.0037)	-0.0002 (0.0022)	-0.0003 (0.0026)	0.0000 (0.0002)	0.0003 (0.0030)	0.0005 (0.0043)	0.0009 (0.0080)
Hired Out Services	0.2013* (0.1083)	-0.0141* (0.0081)	-0.0095* (0.0053)	-0.0120* (0.0066)	-0.0069* (0.0037)	-0.0076** (0.0037)	0.001328 (0.0012)	0.0102* (0.0059)	0.0138* (0.0074)	0.0247* (0.0127)
Managing Land, Eqpt, and Facilities	-0.0694 (0.1512)	0.0047 (0.0105)	0.0032 (0.0071)	0.0041 (0.0090)	0.0024 (0.0052)	0.0028 (0.0058)	-0.0003 (0.0010)	-0.0034 (0.0077)	-0.0048 (0.0104)	-0.0087 (0.0187)

Table 4.7. Cont.

Managing Production	-0.2117* (0.1141)	0.0148* (0.0085)	0.0099* (0.0056)	0.0127* (0.0069)	0.0072* (0.0039)	0.0080** (0.0039)	-0.00137 (0.0012)	-0.0107* (0.0062)	-0.0145* (0.0078)	-0.0260* (0.0135)
Output Prices	-0.2600 (0.1816)	0.0190 (0.0147)	0.0126 (0.0094)	0.0156 (0.0111)	0.0087 (0.0058)	0.0089* (0.0048)	-0.0024 (0.0029)	-0.0138 (0.0106)	-0.0178 (0.0122)	-0.0308 (0.0198)
Controlling Costs	-0.0791 (0.1088)	0.0053 (0.0075)	0.0036 (0.0051)	0.0047 (0.0065)	0.0027 (0.0038)	0.0032 (0.0043)	-0.0003 (0.0006)	-0.0038 (0.0054)	-0.0055 (0.0075)	-0.0100 (0.0136)
Managing People	0.288068 (0.1798)	-0.0172* (0.0097)	-0.0121* (0.0071)	-0.0164* (0.0099)	-0.0103 (0.0065)	-0.0143 (0.0101)	-0.0012 (0.0021)	0.0114** (0.0057)	0.0197 (0.0121)	0.0404 (0.0274)
Female	0.2685* (0.1570)	-0.0165* (0.0090)	-0.0115* (0.0065)	-0.0155* (0.0089)	-0.0095* (0.0057)	-0.0128 (0.0083)	-0.0006 (0.0013)	0.0113** (0.0057)	0.0184* (0.0107)	0.0367 (0.0229)
Age	0.0015 (0.0034)	-0.0001 (0.0002)	-0.0001 (0.0002)	-0.0001 (0.0002)	-0.0001 (0.0001)	-0.0001 (0.0002)	0.0000 (0.0000)	0.0001 (0.0002)	0.0001 (0.0002)	0.0002 (0.0004)
Primary Farm Decision Maker	-0.2901 (0.3974)	0.0176 (0.0220)	0.0123 (0.0158)	0.0166 (0.0220)	0.0103 (0.0143)	0.0141 (0.0215)	0.0009 (0.0037)	-0.0119 (0.0134)	-0.0199 (0.0267)	-0.0401 (0.0590)
Spouse of Primary Farm Decisionmaker	-0.1805 (0.4299)	0.0128 (0.0324)	0.0085 (0.0212)	0.0108 (0.0260)	0.0061 (0.0142)	0.0067 (0.0137)	-0.0013 (0.0049)	-0.0093 (0.0236)	-0.0124 (0.0293)	-0.0220 (0.0496)
Other Family Employee	-0.0580 (0.4584)	0.0039 (0.0319)	0.0027 (0.0215)	0.0034 (0.0274)	0.0020 (0.0157)	0.0023 (0.0177)	-0.0003 (0.0028)	-0.0028 (0.0232)	-0.0040 (0.0316)	-0.0073 (0.0567)
Gross Farm Sales ($100,000s)	-0.0015 (0.0031)	0.0001 (0.0002)	0.0001 (0.0001)	0.0001 (0.0002)	0.0001 (0.0001)	0.0001 (0.0001)	0.0000 (0.0000)	-0.0001 (0.0002)	-0.0001 (0.0002)	-0.0002 (0.0004)

Note: Single, double, and triple asterisks (*) denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

Table 4.8. Coefficient Estimates and Marginal Effects for the Importance of Society's View of Something Happening on Your Farm

Independent Variables	Coefficient Estimates	1	2	3	4	5	6	7	8	9
Dairy Cows (1,000 head)	0.2574**	-0.0250**	-0.0107**	-0.0111**	-0.0076**	-0.0095**	-0.00037	0.0071**	0.0188**	0.0383**
	(0.1172)	(0.0114)	(0.0049)	(0.0051)	(0.0035)	(0.0045)	(0.0005)	(0.0033)	(0.0087)	(0.0175)
Hogs (1,000 head)	-0.0033	0.0003	0.0001	0.0001	0.0001	0.0001	0.0000	-0.0001	-0.0002	-0.0005
	(0.0028)	(0.0003)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0000)	(0.0001)	(0.0002)	(0.0004)
Beef Cattle (1,000 head)	-0.0063	0.0006	0.0003	0.0003	0.0002	0.0002	0.0000	-0.0002	-0.0005	-0.0009
	(0.0128)	(0.0013)	(0.0005)	(0.0006)	(0.0004)	(0.0005)	(0.0000)	(0.0004)	(0.0009)	(0.0019)
Corn and Soybeans (1,000 acres)	0.0087	-0.0008	-0.0004	-0.0004	-0.0003	-0.0003	0.0000	0.0002	0.0006	0.0013
	(0.0336)	(0.0033)	(0.0014)	(0.0015)	(0.0010)	(0.0012)	(0.0001)	(0.0009)	(0.0025)	(0.0050)
Wheat (1,000 acres)	0.0441	-0.0043	-0.0018	-0.0019	-0.0013	-0.0016	-0.0001	0.0012	0.0032	0.0066
	(0.0480)	(0.0047)	(0.0020)	(0.0021)	(0.0014)	(0.0018)	(0.0001)	(0.0013)	(0.0035)	(0.0071)
Cotton (1,000 acres)	-0.0341	0.0033	0.0014	0.0015	0.0010	0.0013	0.0000	-0.0009	-0.0025	-0.0051
	(0.1325)	(0.0129)	(0.0055)	(0.0057)	(0.0039)	(0.0049)	(0.0002)	(0.0037)	(0.0097)	(0.0197)
Fruits and Vegetables (1,000 acres)	-0.1272**	0.0123**	0.0053**	0.0055**	0.0037**	0.0047**	0.000183	-0.0035**	-0.0093**	-0.0189**
	(0.0621)	(0.0061)	(0.0026)	(0.0027)	(0.0019)	(0.0023)	(0.0002)	(0.0018)	(0.0046)	(0.0092)
Hired Out Services	0.2463**	-0.0254**	-0.0105**	-0.0106**	-0.0070**	-0.0079***	0.00035	0.0079*	0.0183**	0.0348**
	(0.1093)	(0.0120)	(0.0049)	(0.0048)	(0.0030)	(0.0030)	(0.0006)	(0.0041)	(0.0083)	(0.0147)
Managing Land, Eqpt, and Facilities	-0.2862*	0.0304*	0.0123*	0.0123*	0.0079**	0.0084**	-0.0008	-0.0098	-0.0213*	-0.0395**
	(0.1518)	(0.0176)	(0.0069)	(0.0065)	(0.0040)	(0.0034)	(0.0012)	(0.0062)	(0.0115)	(0.0194)
Managing Production	-0.1453	0.0146	0.0061	0.0063	0.0042	0.0050	0.0000	-0.0044	-0.0107	-0.0210
	(0.1146)	(0.0119)	(0.0049)	(0.0050)	(0.0033)	(0.0037)	(0.0003)	(0.0038)	(0.0085)	(0.0161)

Table 4.8. Cont.

Output Prices	-0.5011***	0.0576**	0.0222***	0.0211***	0.0127***	0.0110***	-0.0032	-0.0195**	-0.0374***	-0.0645***
	(0.1762)	(0.0237)	(0.0084)	(0.0072)	(0.0038)	(0.0020)	(0.0026)	(0.0086)	(0.0132)	(0.0195)
Controlling Costs	0.1166	-0.0111	-0.0048	-0.0050	-0.0035	-0.0045	-0.0003	0.0030	0.0084	0.0176
	(0.1083)	(0.0101)	(0.0044)	(0.0047)	(0.0033)	(0.0044)	(0.0004)	(0.0026)	(0.0078)	(0.0167)
Managing People	0.8341***	-0.0610***	-0.0288***	-0.0328***	-0.0253***	-0.0433***	-0.0112**	0.0022	0.0474***	0.1528***
	(0.1850)	(0.0104)	(0.0057)	(0.0068)	(0.0058)	(0.0115)	(0.0045)	(0.0049)	(0.0072)	(0.0399)
Female	0.1202	-0.0113	-0.0049	-0.0052	-0.0036	-0.0047	-0.0004	0.0030	0.0087	0.0183
	(0.1587)	(0.0145)	(0.0064)	(0.0068)	(0.0048)	(0.0066)	(0.0007)	(0.0036)	(0.0113)	(0.0248)
Age	0.0032	-0.0003	-0.0001	-0.0001	-0.0001	-0.0001	0.0000	0.0001	0.0002	0.0005
	(0.0034)	(0.0003)	(0.0001)	(0.0002)	(0.0001)	(0.0001)	(0.0000)	(0.0001)	(0.0003)	(0.0005)
Primary Farm Decision Maker	0.1647	-0.0168	-0.0070	-0.0071	-0.0047	-0.0054	0.0001	0.0051	0.0122	0.0235
	(0.4122)	(0.0440)	(0.0179)	(0.0177)	(0.0114)	(0.0120)	(0.0013)	(0.0143)	(0.0308)	(0.0566)
Spouse of Primary Farm Decisionmaker	0.1700	-0.0156	-0.0068	-0.0073	-0.0051	-0.0070	-0.0007	0.0039	0.0121	0.0264
	(0.4474)	(0.0389)	(0.0174)	(0.0189)	(0.0137)	(0.0200)	(0.0029)	(0.0083)	(0.031)	(0.0725)
Other Family Employee	0.1848	-0.0168	-0.0074	-0.0079	-0.0056	-0.0077	-0.0008	0.0041	0.0131	0.0290
	(0.4692)	(0.0397)	(0.0180)	(0.0198)	(0.0145)	(0.0217)	(0.0036)	(0.0077)	(0.0320)	(0.0775)
Gross Farm Sales ($100,000s)	0.0049	-0.0005	-0.0002	-0.0002	-0.0001	-0.0002	0.0000	0.0001	0.0004	0.0007
	(0.0031)	(0.0003)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0000)	(0.0001)	(0.0002)	(0.0005)

Note: Single, double, and triple asterisks (*) denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

Table 4.9 shows the results from the ordered logit regression for producers rating the risk of "competition" on a scale from 1 to 9. The coefficient estimates indicated that corn and soybeans, hired out services, age, and gross farm sales were significant. The marginal effects showed that corn and soybeans and gross farm sales were significant in all the outcomes. As the number of corn and soybean acres increased by 1,000, producers were 1.15% more likely to choose 9, "very important." For every $100,000 increase in gross farm sales respondents were 0.10% more likely to choose 9. The variables for hired out service and age were significant for all importance levels, except 6. Respondents that hired out services were 2.92% more likely to choose 9 and 2.46% less likely to choose 1. For every year older, producers were 0.09% less likely to choose 9 and 0.07% more likely to choose 1.

Table 4.9. Coefficient Estimates and Marginal Effects for the Importance of Competition

Independent Variables	Coefficient Estimates	1	2	3	4	5	6	7	8	9
Dairy Cows (1,000 head)	0.0688 (0.1124)	-0.0064 (0.0105)	-0.0026 (0.0043)	-0.0031 (0.0050)	-0.0021 (0.0034)	-0.0030 (0.0048)	0.0004 (0.0007)	0.0032 (0.0052)	0.0050 (0.0082)	0.0085 (0.0140)
Hogs (1,000 head)	-0.0038 (0.0028)	0.0003 (0.0003)	0.0001 (0.0001)	0.0002 (0.0001)	0.0001 (0.0001)	0.0002 (0.0001)	0.0000 (0.0000)	-0.0002 (0.0001)	-0.0003 (0.0002)	-0.0005 (0.0004)
Beef Cattle (1,000 head)	0.0246 (0.0180)	-0.0023 (0.0017)	-0.0009 (0.0007)	-0.0011 (0.0008)	-0.0008 (0.0006)	-0.0011 (0.0008)	0.0001 (0.0001)	0.0011 (0.0008)	0.0018 (0.0013)	0.0031 (0.0022)
Corn and Soybeans (1,000 acres)	0.0928** (0.0361)	-0.0086** (0.0034)	-0.0036** (0.0014)	-0.0041** (0.0017)	-0.0028** (0.0011)	-0.0040** (0.0016)	0.0005* (0.0003)	0.0043** (0.0017)	0.0068** (0.0027)	0.0115** (0.0045)
Wheat (1,000 acres)	0.0648 (0.0486)	-0.0060 (0.0045)	-0.0025 (0.0019)	-0.0029 (0.0022)	-0.0020 (0.0015)	-0.0028 (0.0021)	0.0004 (0.0003)	0.0030 (0.0023)	0.0047 (0.0036)	0.0081 (0.0060)
Cotton (1,000 acres)	-0.0116 (0.1079)	0.0011 (0.0100)	0.0004 (0.0041)	0.0005 (0.0048)	0.0004 (0.0033)	0.0005 (0.0046)	-0.0001 (0.0006)	-0.0005 (0.0050)	-0.0008 (0.0079)	-0.0014 (0.0134)
Fruits and Vegetables (1,000 acres)	-0.0379 (0.0567)	0.0035 (0.0053)	0.0015 (0.0022)	0.0017 (0.0025)	0.0012 (0.0017)	0.0016 (0.0024)	-0.0002 (0.0003)	-0.0018 (0.0026)	-0.0028 (0.0041)	-0.0047 (0.0071)
Hired Out Services	0.2486** (0.1091)	-0.0246** (0.0115)	-0.0098** (0.0046)	-0.0112** (0.0050)	-0.0074** (0.0032)	-0.0091*** (0.0035)	0.002422 (0.0016)	0.0124** (0.0059)	0.0180** (0.0079)	0.0292** (0.0122)
Managing Land, Eqpt, and Facilities	-0.2246 (0.1511)	0.0224 (0.0162)	0.0089 (0.0063)	0.0101 (0.0068)	0.0066 (0.0043)	0.0080 (0.0044)	-0.0023 (0.0023)	-0.0114 (0.0083)	-0.0162 (0.0108)	-0.0262 (0.0165)

Table 4.9 Cont.

Managing Production	-0.0539 (0.1154)	0.0051 (0.0110)	0.0021 (0.0045)	0.0024 (0.0052)	0.0016 (0.0035)	0.0022 (0.0047)	-0.0004 (0.0009)	-0.0025 (0.0055)	-0.0039 (0.0084)	-0.0066 (0.0140)
Output Prices	-0.2487 (0.1760)	0.0252 (0.0194)	0.0100 (0.0074)	0.0112 (0.0079)	0.0073 (0.0049)	0.0085* (0.0046)	-0.0028 (0.0030)	-0.0128 (0.0098)	-0.0179 (0.0125)	-0.0286 (0.0187)
Controlling Costs	0.0532 (0.1081)	-0.0049 (0.0098)	-0.0020 (0.0041)	-0.0024 (0.0048)	-0.0016 (0.0033)	-0.0023 (0.0048)	0.0003 (0.0005)	0.0024 (0.0049)	0.0039 (0.0079)	0.0067 (0.0137)
Managing People	0.1686 (0.1797)	-0.0148 (0.0148)	-0.0062 (0.0064)	-0.0074 (0.0078)	-0.0052 (0.0057)	-0.0081 (0.0095)	0.0003 (0.0005)	0.0071 (0.0068)	0.0123 (0.0130)	0.0221 (0.0248)
Female	-0.0801 (0.1562)	0.0076 (0.0152)	0.0031 (0.0061)	0.0036 (0.0070)	0.0024 (0.0047)	0.0033 (0.0061)	-0.0006 (0.0014)	-0.0038 (0.0077)	-0.0058 (0.0114)	-0.0098 (0.0187)
Age	-0.0074** (0.0034)	0.0007** (0.0003)	0.0003** (0.0001)	0.0003** (0.0002)	0.0002** (0.0001)	0.0003** (0.0002)	0.0000 (0.0000)	-0.0003** (0.0002)	-0.0005** (0.0003)	-0.0009** (0.0004)
Primary Farm Decision Maker	-0.2240 (0.4082)	0.0195 (0.0332)	0.0083 (0.0145)	0.0099 (0.0177)	0.0070 (0.0129)	0.0109 (0.0220)	-0.0003 (0.0013)	-0.0093 (0.0150)	-0.0163 (0.0295)	-0.0295 (0.0569)
Spouse of Primary Farm Decisionmaker	-0.1674 (0.4362)	0.0164 (0.0452)	0.0066 (0.0177)	0.0075 (0.0196)	0.0050 (0.0126)	0.0063 (0.0140)	-0.0016 (0.0056)	-0.0083 (0.0230)	-0.0121 (0.0314)	-0.0198 (0.0491)
Other Family Employee	-0.1057 (0.4650)	0.0102 (0.0467)	0.0041 (0.0186)	0.0047 (0.0209)	0.0032 (0.0137)	0.0041 (0.0164)	-0.0009 (0.0050)	-0.0052 (0.0238)	-0.0077 (0.0337)	-0.0127 (0.0538)
Gross Farm Sales ($100,000s)	0.0080** (0.0031)	-0.0007** (0.0003)	-0.0003** (0.0001)	-0.0004** (0.0001)	-0.0002** (0.0001)	-0.0003** (0.0001)	0.0000* (0.0000)	0.0004** (0.0002)	0.0006** (0.0002)	0.0010** (0.0004)

Note: Single, double, and triple asterisks (*) denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

4.3 Multinomial Logit Model

The multinomial logit model results are presented and discussed below. The survey question used to determine how producers spend their time asked producers to choose from one of six categories. The six categories included: managing land, equipment and facilities; managing production; marketing/prices; controlling costs; managing people; and other. This model is run on crop and livestock producers together, only crop producers, and only livestock producers. Running the variations of the model allows the opportunity to determine any differences amongst the types of producers. The whole model includes 1,885 respondents. The crop model includes 1,177 respondents and the livestock model includes 569 respondents.

Table 4.10 shows the results from the multinomial logit regression resulting in the selection of managing land, equipment, and facilities taking most of a producers' time. The variable for hiring out services was significant at the 0.01 level in the whole model and crop model. In the whole model, the acres of corn and soybeans and gross farm sales were significant towards choosing managing land, equipment, and facilities at the 0.05 level. The livestock model shows the variable dairy cows as significant at the 0.10 level.

Table 4.10. Managing Land Equipment and Facilities Coefficient Estimates

	Whole Model	Crop Model	Livestock Model
Corn and Soybeans (Thousands of acres)	0.6526** (0.3266)	0.5598 (0.3696)	
Wheat (Thousands of acres)	0.0563 (0.1983)	0.0253 (0.2049)	
Cotton (Thousands of acres)	0.0881 (0.585)	0.1720 (0.5255)	
Fruits and Vegetables (Thousands of acres)	0.0248 (0.2653)	-0.0119 (0.2551)	
Dairy Cows (Thousands of head)	-0.4043 (0.2784)		-0.7318* (0.4067)
Beef Cattle (Thousands of head)	0.2580 (0.593)		0.2576 (0.6534)
Hogs (Thousands of head)	0.0001 (0.0106)		0.0027 (0.0127)
Hired out Services	1.1377*** (0.3519)	1.4475*** (0.4962)	0.8647 (0.547)
Managing Land Equipment and Facilities	0.6880 (0.6457)	-0.3160 (0.7173)	16.7162 (2519.287)
Managing Production	-0.0470 (0.4342)	-0.1695 (0.6063)	-0.2585 (0.6605)
Output Prices	1.0958 (1.0473)	14.6463 (1410.412)	0.2474 (1.1149)
Controlling Costs	0.5566 (0.4642)	1.0344 (0.8095)	0.1639 (0.6451)
Managing People	0.1099 (0.7824)	-1.1537 (0.8921)	17.0840 (5462.898)
Primary Farm Decision Maker	-13.4057 (662.3971)	-15.1426 (1991.063)	-15.5165 (2939.94)
Spouse of Primary Farm Decisionmaker	-12.1967 (662.3979)	-0.4078 (2272.084)	-15.2696 (2939.94)
Other nonfamily employee	-0.1655 (1754.521)	-13.8501 (8693.602)	-0.3494 (5386.517)

Table 4.10. Cont.

Age (Years)	0.0112 (0.014)	0.0213 (0.0197)	-0.0048 (0.0225)
Gross Farm Sales (Hundred-thousand dollars)	-0.0237** (0.0115)	-0.0217 (0.0169)	-0.0218 (0.0175)
Constant	14.6577 (662.3978)	15.8534 (1991.063)	17.8119 (2939.94)

Single, double, and triple asterisks (*) denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively

Table 4.11 shows the marginal effects when managing land, equipment, and facilities was chosen. For the whole model, the marginal effects for the dominant strategies of managing land, equipment, and facilities, as well as managing production were significant. Producers that selected managing land, equipment, and facilities as their dominant strategy were 19.92% more likely to choose managing land equipment and facilities as taking most of their time. Producers that selected managing production as their dominant strategy were 18.91% less likely to choose managing land, equipment, and facilities as taking most of their time. In the crop model, other nonfamily employee was found to be significant. When other nonfamily employees responded they were 50.43% less likely to choose managing land, equipment, and facilities as taking most of their time.

Table 4.11. Managing Land Equipment and Facilities Marginal Effects

	Whole Model	Crop Model	Livestock Model
Corn and Soybeans (Thousands of acres)	0.0176	0.0086	
	(0.0884)	(0.1088)	
Wheat (Thousands of acres)	0.0315	0.0252	
	(0.0336)	(0.0240)	
Cotton (Thousands of acres)	0.0669	0.0557	
	(0.1093)	(0.2424)	
Fruits and Vegetables (Thousands of acres)	0.0211	0.0333	
	(0.0281)	(0.0364)	
Dairy Cows (Thousands of head)	-0.0715		-0.1465
	(0.0465)		(0.1154)
Beef Cattle (Thousands of head)	0.0302		0.0016
	(0.2363)		(0.0645)
Hogs (Thousands of head)	0.0170		0.0101
	(0.0198)		(0.0153)
Hired out Services	-0.0037	-0.0067	-0.0062
	(0.2213)	(0.4403)	(0.8915)
Managing Land Equipment and Facilities	0.1992***	0.2049	0.3372
	(0.0655)	(0.2855)	(0.6861)
Managing Production	-0.1891*	-0.1465	-0.1755
	(0.1073)	(0.2172)	(0.1903)
Output Prices	-0.1305	-0.1816	-0.0327
	(0.2669)	(0.5585)	(0.1274)
Controlling Costs	-0.0771	-0.0574	-0.0340
	(0.1061)	(0.2865)	(0.1098)
Managing People	-0.2109	-0.2416	-0.2374
	(0.1421)	(0.5686)	(0.4755)
Primary Farm Decision Maker	-0.0097	-0.0409	0.1179
	(1.7095)	(0.7345)	(3.586)
Spouse of Primary Farm Decisionmaker	-0.5024	-0.0942	-0.4693
	(0.6573)	(1.167)	(1.1552)
Other nonfamily employee	-0.3233	-0.5043***	-0.1730
	(1.2463)	(0.0716)	(1.5922)
Age (Years)	0.0011	-0.0003	0.0039
	(0.0085)	(0.0238)	(0.0059)
Gross Farm Sales (Hundred-thousand dollars)	-0.0028	-0.0016	-0.0040
	(0.0020)	(0.0104)	(0.0060)

Single, double, and triple asterisks (*) denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively

Table 4.12 shows the results from the multinomial logit regression resulting in the selection of managing production taking most of a producers' time. The variable for hiring out services was significant in all three models. In the whole model, the acres of corn and soybeans were significant towards choosing managing production. The dominant strategies of managing production and controlling costs were also significant in the whole model.

Table 4.13 shows the marginal effects when managing production was chosen. There were no variables found to be significant in any of three models for the marginal effects.

Table 4.14 shows the results from the multinomial logit regression resulting in the selection of marketing/ prices taking most of a producer's time. The variables for corn and soybeans, hiring out services, and age were significant in the whole model and crop model. The livestock model shows the variable for gross farm sales was significant at the 0.05 level.

Table 4.12. Managing Production Coefficient Estimates

	Whole Model	Crop Model	Livestock Model
Corn and Soybeans (Thousands of acres)	0.5701* (0.328)	0.4753 (0.3716)	
Wheat (Thousands of acres)	-0.0864 (0.206)	-0.0934 (0.2126)	
Cotton (Thousands of acres)	-0.3616 (0.6807)	-0.2408 (0.6536)	
Fruits and Vegetables (Thousands of acres)	-0.1035 (0.2916)	-0.2035 (0.3036)	
Dairy Cows (Thousands of head)	-0.0600 (0.2416)		0.0231 (0.2934)
Beef Cattle (Thousands of head)	0.2518 (0.5931)		0.2565 (0.6534)
Hogs (Thousands of head)	-0.0061 (0.0123)		-0.0046 (0.0146)
Hired out Services	1.3509*** (0.3601)	1.6858*** (0.5086)	1.1708** (0.5565)
Managing Land Equipment and Facilities	-0.1049 (0.6701)	-1.0998 (0.7527)	14.9835 (2519.287)
Managing Production	1.0036** (0.4359)	0.8049 (0.6097)	0.6551 (0.6551)
Output Prices	1.5706 (1.0516)	15.3909 (1410.412)	0.2938 (1.1279)
Controlling Costs	0.8820* (0.4709)	1.3155 (0.8166)	0.2869 (0.655)
Managing People	0.6001 (0.7886)	-0.3111 (0.8893)	17.2528 (5462.898)
Primary Farm Decision Maker	-13.3178 (662.3972)	-14.7009 (1991.063)	-15.9965 (2939.94)
Spouse of primary farm decisionmaker	-11.8937 (662.3979)	0.2295 (2272.084)	-15.3208 (2939.94)
Other nonfamily employee	1.4282 (1754.52)	3.2621 (8442.434)	0.1193 (5386.517)

Table 4.12. Cont.

Age (Years)	0.0018 (0.0141)	0.0149 (0.0199)	-0.0205 (0.0227)
Gross Farm Sales (Hundred-thousand dollars)	-0.0150 (0.0115)	-0.0146 (0.0171)	-0.0111 (0.0174)
Constant	14.2018 (662.3978)	14.8593 (1991.063)	18.3463 (2939.94)

Single, double, and triple asterisks (*) denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively

Table 4.13. Managing Production Marginal Effects

	Whole Model	Crop Model	Livestock Model
Corn and Soybeans (Thousands of acres)	-0.0151 (0.0571)	-0.0205 (0.0785)	
Wheat (Thousands of acres)	-0.0253 (0.0191)	-0.0206 (0.0559)	
Cotton (Thousands of acres)	-0.1005 (0.0876)	-0.0916 (0.2689)	
Fruits and Vegetables (Thousands of acres)	-0.0274 (0.0407)	-0.0379 (0.1329)	
Dairy Cows (Thousands of head)	0.0640 (0.0787)		0.1634 (0.3711)
Beef Cattle (Thousands of head)	0.0174 (0.1526)		0.0009 (0.0505)
Hogs (Thousands of head)	0.0089 (0.0117)		0.0052 (0.0092)
Hired out Services	0.0614 (0.1162)	0.0638 (0.2938)	0.0980 (0.7250)
Managing Land Equipment and Facilities	-0.1184 (0.1358)	-0.1088 (0.3100)	-0.2710 (0.6629)
Managing Production	0.2319 (0.1814)	0.2329 (0.7028)	0.2064 (0.2502)
Output Prices	0.0604 (0.3460)	0.1015 (1.0925)	-0.0092 (0.1095)
Controlling Costs	0.0543 (0.0654)	0.0509 (0.0878)	0.0185 (0.0753)
Managing People	-0.0146 (0.0693)	0.0600 (0.6072)	-0.1480 (0.3611)
Primary Farm Decision Maker	0.0203 (1.1067)	0.0961 (0.5758)	-0.0782 (2.5847)
Spouse of Primary Farm Decisionmaker	-0.3132 (0.5021)	0.1561 (1.1820)	-0.3672 (0.8580)
Other nonfamily employee	0.2266 (3.7191)	0.5295 (0.7320)	0.0064 (1.9148)
Age (Years)	-0.0023 (0.0041)	-0.0022 (0.0155)	-0.0027 (0.0025)
Gross Farm Sales (Hundred-thousand dollars)	0.0010 (0.0027)	0.0012 (0.0101)	0.0008 (0.0037)

Single, double, and triple asterisks (*) denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively

Table 4.14. Marketing/Prices Coefficient Estimates

	Whole Model	Crop Model	Livestock Model
Corn and Soybeans (Thousands of acres)	0.7525** (0.3302)	0.6522* (0.3752)	
Wheat (Thousands of acres)	0.0311 (0.2207)	-0.0577 (0.2312)	
Cotton (Thousands of acres)	0.1251 (0.6457)	0.2367 (0.5982)	
Fruits and Vegetables (Thousands of acres)	-0.0721 (0.3273)	-0.1642 (0.3338)	
Dairy Cows (Thousands of head)	-0.1238 (0.3014)		0.0630 (0.3365)
Beef Cattle (Thousands of head)	-0.7076 (0.8887)		-0.4969 (1.0645)
Hogs (Thousands of head)	-0.0085 (0.0193)		-0.0129 (0.0298)
Hired out Services	1.1858*** (0.4113)	1.0438* (0.5412)	17.3365 (1101.01)
Managing Land Equipment and Facilities	-0.2015 (0.7606)	-1.0765 (0.8348)	15.2832 (2519.287)
Managing Production	0.5791 (0.4891)	0.3153 (0.6541)	0.2242 (0.9594)
Output Prices	2.3308** (1.0729)	16.0138 (1410.412)	0.6504 (1.3653)
Controlling Costs	0.7780 (0.5181)	0.8971 (0.8549)	0.9023 (0.8342)
Managing People	0.7646 (0.8653)	-0.1617 (0.9652)	17.4148 (5462.898)
Primary Farm Decision Maker	-13.5606 (662.3973)	-15.2742 (1991.063)	0.1364 (3773.222)
Spouse of primary farm decisionmaker	-12.6471 (662.3981)	-0.7966 (2272.084)	-0.2992 (3773.223)
Other nonfamily employee	-12.7317 (2009.651)	-14.1546 (9654.221)	0.6190 (6851.017)

Table 4.14. Cont.

Age (Years)	0.0371** (0.0158)	0.0523** (0.0215)	0.0173 (0.0291)
Gross Farm Sales (Hundred-thousand dollars)	-0.0107 (0.013)	-0.0024 (0.0182)	-0.0729** (0.0365)
Constant	10.9419 (662.3982)	12.3098 (1991.063)	-17.4027 (3930.577)

Single, double, and triple asterisks (*) denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively

Table 4.15 shows the marginal effects when marketing/prices was chosen. For the whole model, the marginal effect for other nonfamily employee was significant in both the whole model and in the crop model. In the whole model, respondents that were other nonfamily employees were 6.42% less likely to select marketing/prices as taking most of their time. In the crop model, other nonfamily employees were 8.44% less likely to choose marketing/prices as taking most of their time.

Table 4.16 shows the results from the multinomial logit regression resulting in the selection of controlling costs taking most of a producers' time. In the whole model, the acres of corn and soybeans were significant towards choosing controlling costs. The variables for hiring out services, gross farm sales and controlling costs were significant in the whole and crop models. In the whole model, the variable for age was also found to be significant.

Table 4.17 shows the marginal effects when controlling costs was chosen. There were no marginal effects that were found to be significant in any of the models when controlling costs was selected as taking most of a respondent's time.

Table 4.15. Marketing/Prices Marginal Effects

	Whole Model	Crop Model	Livestock Model
Corn and Soybeans (Thousands of acres)	0.0077 (0.0675)	0.0090 (0.1565)	
Wheat (Thousands of acres)	0.0022 (0.0198)	-0.0026 (0.0443)	
Cotton (Thousands of acres)	0.0097 (0.0867)	0.0146 (0.2651)	
Fruits and Vegetables (Thousands of acres)	-0.0031 (0.0292)	-0.0069 (0.1162)	
Dairy Cows (Thousands of head)	0.0077 (0.0691)		0.0001 (0.0409)
Beef Cattle (Thousands of head)	-0.0512 (0.4501)		-0.0002 (0.0634)
Hogs (Thousands of head)	0.0014 (0.0127)		0.0000 (0.0005)
Hired out Services	0.0023 (0.0331)	-0.0395 (0.6605)	0.0137 (1.8209)
Managing Land Equipment and Facilities	-0.0247 (0.2221)	-0.0277 (0.4735)	-0.0002 (0.0511)
Managing Production	0.0111 (0.0977)	0.0122 (0.2127)	0.0000 (0.0047)
Output Prices	0.0823 (0.6608)	0.1149 (1.6852)	0.0001 (0.0324)
Controlling Costs	0.0034 (0.0341)	-0.0198 (0.3551)	0.0002 (0.0679)
Managing People	0.0069 (0.0656)	0.0314 (0.5172)	-0.0001 (0.0247)
Primary Farm Decision Maker	-0.0102 (0.2117)	-0.0188 (0.3512)	0.0037 (1.4506)
Spouse of Primary Farm Decisionmaker	-0.0595 (0.5554)	-0.0387 (0.7126)	0.1855 (498.92)
Other nonfamily employee	-0.0642*** (0.019)	-0.0844*** (0.0148)	0.0002 (2.0014)
Age (Years)	0.0016 (0.0139)	0.0025 (0.0427)	0.0000 (0.0026)
Gross Farm Sales (Hundred-thousand dollars)	0.0004 (0.0037)	0.0013 (0.0223)	0.0000 (0.0050)

Single, double, and triple asterisks (*) denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively

Table 4.16. Controlling Costs Coefficient Estimates

	Whole Model	Crop Model	Livestock Model
Corn and Soybeans (Thousands of acres)	0.6050* (0.3348)	0.5359 (0.3798)	
Wheat (Thousands of acres)	0.0848 (0.2102)	0.0655 (0.2195)	
Cotton (Thousands of acres)	0.0289 (0.6541)	0.1497 (0.5892)	
Fruits and Vegetables (Thousands of acres)	-0.0399 (0.2916)	-0.0572 (0.2842)	
Dairy Cows (Thousands of head)	-0.0677 (0.2636)		0.0039 (0.3162)
Beef Cattle (Thousands of head)	0.2177 (0.5983)		0.2270 (0.6563)
Hogs (Thousands of head)	-0.6227 (0.5033)		-0.3557 (0.3789)
Hired out Services	0.7999** (0.3857)	1.1815** (0.5458)	0.7337 (0.5978)
Managing Land Equipment and Facilities	-0.6132 (0.7543)	-1.4554* (0.8542)	15.1756 (2519.287)
Managing Production	-0.4873 (0.5088)	-1.2267 (0.7625)	-0.5571 (0.7618)
Output Prices	1.1994 (1.0914)	14.7445 (1410.412)	0.2793 (1.2086)
Controlling Costs	1.1435** (0.4888)	1.5619* (0.8334)	0.4651 (0.6894)
Managing People	0.0384 (0.8927)	-0.5414 (1.0385)	16.8674 (5462.898)
Primary Farm Decision Maker	-14.0082 (662.3972)	-15.5926 (1991.063)	-16.2992 (2939.94)
Spouse of primary farm decisionmaker	-12.2451 (662.398)	-0.6314 (2272.084)	-14.9731 (2939.94)
Other nonfamily employee	1.8713 (1754.521)	2.8286 (8442.434)	1.0465 (5386.517)
Age (Years)	0.0255* (0.0153)	0.0302 (0.0214)	0.0153 (0.0247)
Gross Farm Sales (Hundred-thousand dollars)	-0.0371*** (0.0138)	-0.0620*** (0.0218)	-0.0111 (0.0194)
Constant	13.0787 (662.398)	14.5777 (1991.063)	15.8999 (2939.940)

Single, double, and triple asterisks (*) denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively

Table 4.17. Controlling Costs Marginal Effects

	Whole Model	Crop Model	Livestock Model
Corn and Soybeans (Thousands of acres)	-0.0006 (0.0096)	-0.0004 (0.0148)	
Wheat (Thousands of acres)	0.0046 (0.0059)	0.0064 (0.0440)	
Cotton (Thousands of acres)	0.0038 (0.0172)	0.0064 (0.0717)	
Fruits and Vegetables (Thousands of acres)	-0.0011 (0.0071)	0.0016 (0.0297)	
Dairy Cows (Thousands of head)	0.0097 (0.0141)		0.0211 (0.0532)
Beef Cattle (Thousands of head)	0.0010 (0.0254)		-0.0013 (0.0084)
Hogs (Thousands of head)	-0.0296 (0.0215)		-0.0167 (0.0181)
Hired out Services	-0.0194 (0.0369)	-0.0214 (0.1461)	-0.0073 (0.0943)
Managing Land Equipment and Facilities	-0.0337 (0.0317)	-0.0402 (0.1365)	-0.0326 (0.0935)
Managing Production	-0.0347 (0.0254)	-0.0680 (0.3497)	-0.0290 (0.0423)
Output Prices	-0.0090 (0.0348)	-0.0210 (0.1928)	-0.0019 (0.0281)
Controlling Costs	0.0239 (0.0214)	0.0315 (0.0956)	0.0120 (0.0229)
Managing People	-0.0235 (0.0223)	-0.0033 (0.1641)	-0.0305 (0.0612)
Primary Farm Decision Maker	-0.0386 (0.1651)	-0.0454 (0.2794)	-0.0295 (0.3447)
Spouse of Primary Farm Decisionmaker	-0.0511 (0.0685)	-0.0254 (0.2127)	-0.0480 (0.1672)
Other nonfamily employee	0.0830 (0.9118)	0.0546 (0.1956)	0.0760 (0.6964)
Age (Years)	0.0008 (0.0013)	0.0006 (0.0050)	0.0014 (0.0034)
Gross Farm Sales (Hundred-thousand dollars)	-0.0010 (0.0006)	-0.0030 (0.0147)	0.0001 (0.0007)

Single, double, and triple asterisks (*) denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively

Table 4.18 shows the results from the multinomial logit regression resulting in the selection of managing people taking most of a producer's time. The variable for hiring out services was significant in the whole model and crop model. In the whole model, the acres of corn and soybeans and the dominant strategy of managing people were significant towards choosing managing people.

Table 4.19 shows the marginal effects when managing people was chosen. The variable for age was found to be significant in the livestock model. As producers' age increased they were 0.26% less likely to choose managing people as taking most of their time. There were no other variables in any of the models that were significant for the marginal effects.

Table 4.18. Managing People Coefficient Estimates

	Whole Model	Crop Model	Livestock Model
Corn and Soybeans (Thousands of acres)	0.5626* (0.3369)	0.6161 (0.3788)	
Wheat (Thousands of acres)	-0.2010 (0.2397)	-0.1898 (0.2498)	
Cotton (Thousands of acres)	0.2458 (0.6466)	0.3452 (0.5952)	
Fruits and Vegetables (Thousands of acres)	0.1369 (0.264)	0.1103 (0.2519)	
Dairy Cows (Thousands of head)	-0.4452 (0.4503)		-0.7732 (0.5987)
Beef Cattle (Thousands of head)	0.2648 (0.5935)		0.2476 (0.6556)
Hogs (Thousands of head)	-0.0041 (0.0176)		-0.0064 (0.0218)
Hired out Services	0.8207** (0.4029)	1.5884*** (0.5999)	0.1494 (0.6091)
Managing Land Equipment and Facilities	0.0053 (0.7589)	-1.4227 (0.9334)	15.8293 (2519.287)
Managing Production	0.1294 (0.4967)	-0.5641 (0.7133)	0.1526 (0.7373)
Output Prices	1.4598 (1.0989)	14.8550 (1410.412)	0.6630 (1.1962)
Controlling Costs	0.7382 (0.5166)	1.0684 (0.8653)	0.2687 (0.7276)
Managing People	2.2767** (0.7901)	0.9300 (0.9008)	19.4709 (5462.898)
Primary Farm Decision Maker	-13.5938 (662.3973)	-15.0042 (1991.063)	-16.0193 (2939.94)
Spouse of primary farm decisionmaker	-12.3598 (662.3981)	-0.1603 (2272.084)	-15.7924 (2939.94)
Other nonfamily employee	1.7028 (1754.52)	2.3339 (8442.434)	0.7117 (5386.517)
Age (Years)	-0.0072 (0.0153)	0.0105 (0.0219)	-0.0365 (0.0244)
Gross Farm Sales (Hundred-thousand dollars)	0.0150 (0.0121)	0.0217 (0.018)	0.0139 (0.0182)
Constant	13.6836 (662.398)	13.5258 (1991.064)	18.6238 (2939.94)

Single, double, and triple asterisks (*) denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively

Table 4.19. Managing People Marginal Effects

	Whole Model	Crop Model	Livestock Model
Corn and Soybeans (Thousands of acres)	-0.0037 (0.0132)	0.0038 (0.0264)	
Wheat (Thousands of acres)	-0.0130 (0.0113)	-0.0085 (0.0310)	
Cotton (Thousands of acres)	0.0196 (0.0273)	0.0149 (0.0993)	
Fruits and Vegetables (Thousands of acres)	0.0104 (0.0071)	0.0099 (0.0587)	
Dairy Cows (Thousands of head)	-0.0124 (0.0247)		-0.0385 (0.0537)
Beef Cattle (Thousands of head)	0.0045 (0.0317)		-0.0007 (0.0166)
Hogs (Thousands of head)	0.0020 (0.0027)		0.0014 (0.0030)
Hired out Services	-0.0242 (0.0479)	0.0063 (0.0434)	-0.0971 (0.2220)
Managing Land Equipment and Facilities	-0.0195 (0.0331)	-0.0291 (0.0977)	-0.0299 (0.1862)
Managing Production	-0.0159 (0.0176)	-0.0305 (0.1791)	-0.0017 (0.0415)
Output Prices	0.0045 (0.0669)	-0.0113 (0.1410)	0.0440 (0.1294)
Controlling Costs	0.0014 (0.0194)	-0.0044 (0.0544)	0.0035 (0.0423)
Managing People	0.2467 (0.1673)	0.1529 (0.4487)	0.4196 (0.3431)
Primary Farm Decision Maker	-0.0146 (0.2275)	0.0029 (0.0849)	-0.0262 (0.7705)
Spouse of Primary Farm Decisionmaker	-0.0689 (0.0822)	0.0019 (0.1544)	-0.1144 (0.1611)
Other nonfamily employee	0.0835 (1.0299)	0.0054 (0.0914)	0.0904 (1.0922)
Age (Years)	-0.0011 (0.0008)	-0.0006 (0.0032)	-0.0026* (0.0016)
Gross Farm Sales (Hundred-thousand dollars)	0.0022 (0.0018)	0.0021 (0.0096)	0.0030 (0.0048)

Single, double, and triple asterisks (*) denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively

4.4 Segmentation Results

The producers' responses to the survey were used to segment producers into groups based on the importance they assigned to different areas of risk. Initially, all nine risks were used to do a two-step clustering. This resulted in two clusters with a model fit that was fair. After looking at the results, there were four main areas of risk that were driving these clusters, including: not having adequate land or physical resources; not having adequate skills, knowledge, or human resources; competition; and society's view of something happening on your farm. A factor analysis was done on the nine questions to determine if there were any risk variables that should be factored out to reduce the number of variables. Principal component analysis was used, followed by Varimax rotation. The results from the factor analysis showed that the questions loaded on to two components, which were determined to represent strategic risks and traditional risks based on research by Miller, Dobbins, Pritchett, Boehlje, and Ehmke (2004). They recognized that operational or traditional risks are often easier to manage and have more options to help manage than strategic risks (Miller et al. 2004).

In this study, the first component was comprised of strategic type risks, which included: being too concentrated in one area of production; regulatory compliance; not having adequate land or physical resources; not having adequate skills, knowledge, or human resources; society's view of something happening on your farm; and competition. The second component was comprised of what Miller et al. refer to as "operational risk" and will be called traditional risk in this study (2004). The traditional risks included: fluctuations in the prices of things you buy for your farm; fluctuations in prices you receive for your production; and fluctuations in yields.

Based on the results from the initial cluster analysis and the factor analysis, the producers' responses to the strategic risks were different than their responses to traditional risks so two separate cluster analyses were completed. The strategic risks include risks that producers often don't have help managing and producers in this study were less concerned about. Traditional risks are risks that producers often do have help managing through crop insurance, futures, and forward pricing techniques. Producers rated these risks as more important.

The results when the traditional risks were used in a two-step cluster algorithm split producers into two groups. The cluster quality based on the silhouette measure of cohesion and separation was above 0.5 in the "Good" range. The first group was comprised of 67.6% of respondents. This group rated the risks as relatively more important on a scale from 1 to 9, with the average risk rating for fluctuations in the prices of things you buy for your farm being 8.28; the average risk rating for fluctuations in yields being 8.41; and the average for fluctuations in prices you receive for your production being 8.74. The second group was comprised of 32.4% of respondents and overall the group rated the risks as more neutral in importance. The average risk rating for fluctuations in the prices of things you buy for your farm was 6.07. The average risk rating for fluctuations in yields was 6.24 and the average risk rating for fluctuations in the prices you receive for your production was 7.08. Overall both groups had averages that were on the important end of the scale, but group one viewed the risks as more important than group two.

The results when the strategic risks were used with a two-step cluster algorithm also split producers into two groups. The cluster quality was not quite in "Good" range

for the measure of cohesion and separation. The two risks that were the most important in separating producers into groups were society's view of something happening on your farm and not having adequate skills, knowledge, or human resources. Group one was comprised of 60.6% of respondents. These respondents were more neutral in the importance of risks than the second group. The average risk rating for society's view of something happening on your farm was 4.50. For the risk of not having adequate skills, knowledge, or human resources the average risk rating was 4.51. The remaining four risks also were found to have average risk ratings in the 4-5 range.

Group 2 was composed of 39.4% of respondents and viewed the risks as more important. For the risk of society's view of something happening on your farm, the average risk rating was 7.67. For the risk of not having adequate skills, knowledge, or human resources the average risk rating was 7.34. For the remaining risks all the average risk ratings were in the 7-8 range. One producer characteristic worth noting was that 50.6% of respondents found in group two are producers with gross farm sales under $500,000.

After the two-step cluster algorithm was done, the non-hierarchical clustering method of k-means clustering was utilized. Again, the strategic risks and traditional risks were analyzed using separate clustering analysis.

The results when the traditional risks were used in the k-means cluster analysis changed the size of the groups slightly. The first group is comprised of 76.79% of respondents. This group viewed the risks as more important, with the mean rating for fluctuations in the prices of things you buy for your farm being 8.14; the mean for fluctuations in yields being 8.68; and the mean for fluctuations in prices you receive for

your production being 8.23. The second group was comprised of 23.2% of respondents and overall the group rated the importance of the risks as more neutral. The mean rating for fluctuations in the prices of things you buy for your farm was 5.65. The mean for fluctuations in yields was 6.64 and the mean for fluctuations in the prices you receive for your production was 7.08. Overall both groups had averages that were on the important end of the scale, but group one rated the risks as more important than group two.

The results when the strategic risks were used with a k-means cluster analysis also split producers into two groups. Group one was comprised of 43.8% of respondents. These respondents were more neutral in importance then the second group. The average risk rating for society's view of something happening on your farm was 3.88. For the risk of not having adequate skills, knowledge, or human resources the average risk rating was 4.10. The remaining four risks also were found to have average risk ratings in the 3-5 range.

Group 2 was composed of 56.2% of respondents and rated the risks as more important. For the risk of society's view of something happening on your farm, the average risk rating was 7.20. For the risk of not having adequate skills, knowledge, or human resources the average risk rating was 6.81. For the remaining risks, all the average risk ratings were in the 6-8 range. Respondents with gross farm sales under $500,000 made up 50.5% of group one.

It was found that 27.6% of producers rated the importance of the risk more neutral for strategic risks and more important for traditional risks and 7.3% rated risks as more important for strategic risks and rated risk as neutral in importance for traditional risks. Producers that rated the importance of traditional and strategic risks as neutral in

importance accounted for 16.1% of producers. It was found that 49% of producers chose traditional and strategic risks as more important. Thirty-three percent of fruit and vegetable producers' responses had strategic risks as more neutral in importance and chose traditional risks as more important. Similarly, 33% of females also chose strategic risks as more neutral in importance and chose traditional risks as more important. Only 21% of 40-54 year olds found both types of risk as neutral in importance.

Based on each set of cluster analysis results, an attempt to predict producers into groups based on other questions in the survey using a logit model was performed. However, the results for this model were not statistically significant.

4.5 Summary of Results

This chapter discussed the results of the different models utilized to examine the results from the 2013 Large Commercial Producer Survey. There were several factors that were significant in the ordered logit model that helped determine the likelihood of producers rating risks into different levels of importance. Some of those variables included gender, age, gross farm sales, their dominant strategy, their role on the farm, type of producer, and if they hired out services. The multinomial logit model had fewer significant variables and proved harder to predict the likelihood of producers picking one of the six categories for what takes most of their time based on the information available from the survey. The principal component analysis showed that the risks were split into two components, traditional and strategic. When each set of risks were used to segment producers the results showed two groups for each. For the traditional risks, there was a

larger group of producers that rated the risks towards the “very important” end of the scale and a second group that rated the risks closer to the neutral part of the scale. For the strategic risks the two groups had average risk ratings further apart. The larger group rated the risks on the “not at all important” end of the scale. The second smaller group rated the risks on the “very important” end of the scale.

CHAPTER 5. CONCLUSIONS

5.1 Overview

This chapter will discuss the conclusions from this study beginning with a summary of the research and finishing by summarizing the results. The main objective of the study was to determine variables that impact producers' perceptions of risk and time allocation and to also determine the different segments of producers based on their risk preferences. These objectives were met as we were able to identify significant variables and to also determine segments of producers based on their risk perceptions and time allocation.

5.2 Study Review

In previous studies focusing on agricultural producers, risk has been a major area of interest and focal point. This helped to direct the focus of our research on producers risk perceptions. There is also a lack of research focusing on how larger commercial producers spend their time managing their operations, which lead to interest into researching this area as well. Many previous studies utilized Likert scales to obtain producers' rating of a risk. This study followed many of the same procedures and utilized an ordered logit model, a multinomial logit model, and cluster analysis.

5.3 Ordered Logit Model

The ordered logit model provided insight into the likelihood of a producer selecting a specific risk perception based on their demographic information and responses to other survey questions. It was found that for several of the risks, female respondents rated risk factors as "very important" more frequently than male respondents. It was also found that often the producers' dominant strategy was a significant variable in the models. Age was found to be significant for many of the risk categories, as were gross farm sales, and hiring out services. Corn and soybean producers had a higher probability of rating the importance of competition on the "very important" end of the scale. Dairy cow producers were more concerned with society's view of something happening on their farm and regulatory compliance than other producers. Beef cattle producers were more concerned with not having adequate land or physical resources than other producers. Overall the ordered logit model gave us insight into the types of producers that were more concerned with specific risks.

Agribusinesses can use this information to tailor the conversations they have with producers. When agribusinesses are selling products to female producers, they can focus their conversation on risks and how their products will help manage risks since females rate risks as more important. When agribusinesses are working with corn and soybean producers, they can talk about competition and the potential edge their product brings for the producer. Talking with dairy cow producer about how they are managing society's view of something happening on their farm and regulatory compliance will have those producers' attention. By talking to beef cow producers about having adequate land and physical resources and understanding their concern, agribusinesses could win their

business. Agribusinesses should use these finding to understand the risks that are important to different types of producers and then have conversations with producers about those risks. If they have products that would help manage those risks they should offer them, but if they do not at least taking the time to talk to producers about risks that are important to them makes a producer more likely to consider another product or service that is being offered.

5.4 Multinomial Logit

The multinomial logit model provided insight into the likelihood that a producer would select one of the six time management categories as taking most of their time. Managing land, equipment, and facilities was more often selected as taking most of a producers' time when managing land, equipment, and facilities was selected as their dominant strategy. Respondents that were nonfamily employees said marketing/prices takes most of their time less than the other groups. As producers get older in the livestock model, they were less likely to choose managing people as taking most of their time. Overall, the multinomial logit model gave us some insight into the types of producers that chose different categories as taking most of their time. While many of the variables were not statistically significant, this further supports the idea farmers are entrepreneurs and very individualized in their thinking. Working with one farmer does not mean another farmer will manage their operation the same way.

Agribusinesses can use information regarding what takes most of a producers' time to offer specific services to different segments of producers to better meet their

needs. For producers that spend most of their managing land, equipment, and facilities, agribusinesses can offer products such as pieces of equipment that would help improve the efficiency of the business. For producers that spend most of their time on controlling costs, agribusinesses should look to highlight the options of forward pricing inputs. For those producers that spend most of their time managing people, agribusinesses could offer human resources training that would allow those producers to learn how to better manage people. Offering better feeds or new scales to track animal's weights could help producers that spend most of their managing production. For producers spending most of their time on marketing/prices, agribusinesses should look to highlight futures and basis contract options. Further research and studies should be done to further explore producers' reasoning for spending their time in specific ways.

5.5 Cluster Analysis

The cluster analysis using the traditional risks of: fluctuations in the prices of things you buy for your farm; fluctuations in prices you receive for production; and fluctuations in yields, resulted in two clusters. One cluster represented 77% of respondents. This group included producers who rated these risks on the "very important" end of the scale, with the cluster centers being above 8. The second group of respondents, which was 23% of respondents, rated the risks at a more neutral point on the scale than the first group. The risks had cluster centers from 5 to 7. These producers still rated the risks on the "very important" end of the scale, but were less concerned than the other group of producers. This information is useful because agribusinesses can

recognize that there are two segments of producers based on their traditional risk perceptions. Agribusinesses that offer crop insurance, can contract input prices, and offer futures and basis contracts are likely to have more success selling their products to producers that fall in cluster one, the group that rated risks more important. This group of producers is large and are likely to be interested in the products they offer.

The cluster analysis on strategic risks also split producers into two groups. The strategic risks included: being too concentrated in one area of production; regulatory compliance; not having adequate land or physical resources; not having adequate skills, knowledge, or human resources; society's view of something happening on your farm; and competition. The first group is made up of 44% of respondents. These respondents rated these risks on the "not at all important" end of the scale, with cluster centers found to be in the 3-5 range. Group two was composed of 56% of producers and this group was found to rate these risks on the "very important" end of the scale. The average risk rating in this group was found to be in the 6-8 range. Respondents with gross farm sales under $500,000 made up more than 50% of this group. Agribusinesses recognizing that there are two groups of producers for the strategic risks allows them to offer specific services that would meet each groups' needs.

The cluster analysis illustrated how producers were clustered based on their risk perceptions; however, we were not able to predict producers into these groups based on demographic or other survey information. The results from this study are useful to agribusinesses, as they can recognize that there are two groups that producers fall in to for both strategic and traditional risks. Agribusinesses can use this information to tailor specific products that would benefit each group. They could offer multiple levels of

insurance for some of the risks to allow producers to choose their level of coverage. They could offer services to help manage risks such as regulatory compliance also at different levels. Producers that see regulatory compliance as more important are likely to want a hands on way of managing this risk. Also, offering a less intense management program for producers that view this risk as neutral in importance makes it more likely that these producers would also want the product. If agribusinesses are able to have conversations that better relate to what is important to producers, they are more likely to win their business. Connecting with producers right away can keep producers engaged and more open to buying products.

5.6 Hypothesis Findings

This research found that producers with different risk perceptions did have different characteristics. Producers that were older were found to rate the risk for yield higher than younger producers. The research also found that younger producers rated the risk of not having adequate land or physical resources higher than older producers. Producers with different time perceptions did not have very many variables which were significant so overall based on the predicting variables we did not have insight as to types of producers that spent most of their time in one area. In the risk sections, for a few of the risks, crop producers did differ from livestock producers. Livestock producers were found to be more concerned with society's view of something happening on the farm than crop producers. The primary operator and employees did sometimes rate risks differently. For fluctuations in yields, other family employee rated this risk lower. The different

segments of producers had some variations, but the information we had about the producers did not give clear distinctions that certain types of producers fell into one group. Livestock producers and crop producers were equally split into the segments. Producers with larger gross farm sales were fairly equally split between segments.

5.7 Summary

This research used data from the 2013 Large Commercial Producer Survey to predict the likelihood of producers rating specific risks, predict the likelihood of producers choosing an activity as taking most of their time, and to segment producers into groups based on their risk perceptions. This chapter provided overviews of each of the models. From this research, agribusinesses can recognize that different types of producers will view risks as more important and will spend most of their time differently. It is important to recognize these differences between producers and have conversations with producers about making their operation more efficient or about risks that are important to them. Relating to producers will allow agribusinesses to get their attention and potentially allow them to win their business. Agribusinesses should also offer multiple products that would meet the needs of the different segments of producers.

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APPENDIX

Appendix A Large Commercial Producer Survey

1. Are you primarily a ***livestock*** producer or a ***crop*** producer?

   □ Livestock **Continue with Question #2** □ Crop **GO TO Question #4**

2. *For **LIVESTOCK** producers*: How large is your farming operation? How large do you expect it to be in five years? (*complete appropriate boxes*)

L I V E S T O C K		This Year	In 5 Years
Cows milked per year	(Avg)		
Finished hogs marketed per year	(#)		
Feeder pigs marketed per year	(#)		
Finished cattle marketed per year	(#)		
Feeder/stock cattle marketed per year	(#)		
Custom cattle fed per year	(#)		
Custom heifers fed per year	(#)		

3. *For **LIVESTOCK** producers*: What percentage of the farming activities listed below was hired out either to a retailer, other farmer, or private custom service provider in 2012?

	NONE	**1-25%**	**26-50%**	**51-75%**	**76-100%**	**N/A**
a. Fertilizer/Manure Application	□	□	□	□	□	□
b. Reproduction Services	□	□	□	□	□	□
c. Feed and Nutrition Services	□	□	□	□	□	□
d. Animal Health and Veterinary Services	□	□	□	□	□	□

GO TO Question #6

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4. *For **CROP** producers*: How large is your farming operation? How large do you expect it to be in five years? (*complete appropriate boxes*)

C R O P S (*Acres planted*)	This year	In 5 years
Corn		
Soybeans		
Wheat, barley, other small grains		
Cotton		

Potatoes		
Tomatoes		
Other fruits and vegetables		

5. *For **CROP** producers*: What percentage of the farming activities listed below was hired out either to a retailer, other farmer, or private custom service provider in 2012?

	NONE	1-25%	26-50%	51-75%	76-100%	N/A
a. Fertilizer Application	□	□	□	□	□	□
b. Crop protection chemical application	□	□	□	□	□	□
c. Seeding	□	□	□	□	□	□
d. Harvesting	□	□	□	□	□	□

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6. When selecting a dealer or retailer for expendable inputs *(seed, feed/nutrition, crop protection chemicals, animal health products, etc)*, please rank the following attributes in order of importance to you.

Rank **Service Attribute** *(enter 1, 2, or 3 in space provided, use a number only once)*

____ Services provided
____ Information provided
____ People who work for them

7. On a scale of 1 to 9 where 1 means "***Not at all important***" and 9 means "***Very Important***", how important are the following when hiring others to perform services on your farm? (*circle response*)

a. Limited Labor 1 2 3 4 5 6 7 8 9
b. Improved timeliness 1 2 3 4 5 6 7 8 9
c. Cost of custom hiring (*less equipment ownership*)
1 2 3 4 5 6 7 8 9
d. Limited knowledge/information
1 2 3 4 5 6 7 8 9
e. Regulatory or record keeping burden
1 2 3 4 5 6 7 8 9

8. Do you currently use any of the following types of independent paid consultants on your farm? Do you plan to do so in the next 5 years? (*check all that apply*)

	Today	5 Years
a. Independent crop consultant	□	□
b. Environmental consultant	□	□
c. Marketing consultant	□	□
d. Management consultant	□	□
e. Certified Public Accountant	□	□
f. Financial Advisor	□	□
g. Attorney on Retainer	□	□

9. On a scale of 1 to 9 where 1 means "***Not at all important***" and 9 means "***Very Important***", how important are the following information sources for your management/purchasing decisions? (*circle response*)

a. Extension Services	1	2	3	4	5	6	7	8	9
b. Manufacturer Representatives	1	2	3	4	5	6	7	8	9
c. Independent, paid consultants	1	2	3	4	5	6	7	8	9
d. Local dealer sales staff	1	2	3	4	5	6	7	8	9
e. Local dealer technical support	1	2	3	4	5	6	7	8	9
f. Lender	1	2	3	4	5	6	7	8	9
g. Other business services providers	1	2	3	4	5	6	7	8	9
h. Other farmers	1	2	3	4	5	6	7	8	9

10. Which of the following pairs is most important to your success as a farmer? (*check one box for each pair*)

□ Managing Land, Equipment, and Facilities . . . . *or* . . . . . □ Output Prices

□ Managing Production . . . . . *or* . . . . . □ Output Prices

□ Output Prices . . . . . *or* . . . . . □ Managing People

□ Controlling Costs . . . . . *or* . . . . . □ Managing Land, Equipment, and Facilities

□ Output Prices . . . . . *or* . . . . . □ Controlling Costs

□ Managing Land, Equipment, and Facilities . . . . *or* . . . . . □ Managing Production

□ Managing Production . . . . . *or* . . . . . □ Controlling Costs

□ Managing People . . . . . *or* . . . . . □ Managing Land, Equipment, and Facilities

□ Controlling Costs . . . . . *or* . . . . . □ Managing People

□ Managing People . . . . . *or* . . . . . □ Managing Production

11. About what percent of your total finance needs are met through financing provided by your dealer/retailer?

	NONE	1-25%	26-50%	51-75%	76-100%	N/A
a. Capital item purchases *(machinery, etc)*	□	□	□	□	□	□
b. Expendable item purchases (seed, *feed/nutrition, etc*)	□	□	□	□	□	□

12. When borrowing money do you typically borrow from the lender with the lowest rate? □ Yes □ No

13. On a scale of 1 to 9 where 1 means "**Not at all important**" and 9 means "**Very Important**", how important are the following media sources for receiving information about management and purchasing decisions?

a. Dealer or retailer meetings	1	2	3	4	5	6	7	8	9
b. Direct Promotional Mailings	1	2	3	4	5	6	7	8	9
c. Subscribed Email Newsletter	1	2	3	4	5	6	7	8	9
d. Subscribed Text Message Notifications	1	2	3	4	5	6	7	8	9
e. Social Media (Twitter, Facebook)	1	2	3	4	5	6	7	8	9
f. Ag TV Programs	1	2	3	4	5	6	7	8	9
g. Ag Radio Programs	1	2	3	4	5	6	7	8	9
h. Field Days	1	2	3	4	5	6	7	8	9
i. Farm Publications	1	2	3	4	5	6	7	8	9
j. Dealer or Retailer Website	1	2	3	4	5	6	7	8	9
k. Manufacturers Website	1	2	3	4	5	6	7	8	9
l. Ag Media Website	1	2	3	4	5	6	7	8	9
m. Farm Shows	1	2	3	4	5	6	7	8	9
n. University Publications	1	2	3	4	5	6	7	8	9

14. Have you changed your primary dealer or retailer for ***seed and/or crop protection chemicals*** *(CROP producers)* or ***feed/nutrition and/or animal health products*** *(LIVESTOCK producers)* in the past 5 years?

□ Yes □ No

If Yes: Why did you switch?

_____

15. Thinking of agricultural sales people you deal with, rank the following attributes in order of importance to you.

Rank **Salesperson Attribute** *(enter 1, 2, 3, 4, or 5 in space provided, use a number only once)*

____ Very high level of technical competence
____ Represents my interests
____ Is honest
____ Is a friend
____ Knows my operation well

16. For each of the purchases listed below, please rank these attributes - ***price***, ***product performance,*** and ***dealer/retailer relationship*** – in order of importance to

x)

SEED or FEED & NUTRITION Purchases

Rank	Attributes
____	Price
____	Performance

FERTILIZER Purchases

Rank	Attributes
____	Price
____	Performance
	Dealer/Retailer Relationship

CROP PROTECTION or ANIMAL HEALTH PRODUCT Purchases

Rank	Attributes
____	Price
	Performance

CAPITAL EQUIPMENT Purchases

Rank	Attributes
____	Price
____	Performance

17. Which of the following takes most of your time? *(check only one)*

□ Managing Land, Equipment, and Facilities
□ Managing Production
□ Marketing/Prices
□ Controlling Costs
□ Managing People
□ Other (*specify*) _____

18. For the **BRANDS** from which you ***primarily*** purchase the products listed below, please indicate if you agree with the following statements: (*check all that apply*)

	B R A N D S				
Seed	**Crop Protection**	**Feed/ Nutrition**	**Animal Health**	**Fertilizer**	**Capital Equipment**
a. I will do more business with this brand					

□ □ □ □ □ □

b. I endorse this brand to my neighbors

□ □ □ □ □ □

c. I try products other than this brand

□ □ □ □ □ □

d. I would switch to another brand for a 5% savings

□ □ □ □ □ □

e. I would switch to another brand for a 10% savings

□ □ □ □ □ □

f. I would help this brand's company develop new products and services

□ □ □ □ □ □

g. I would invest in this brand's company

□ □ □ □ □ □

h. I am loyal to this brand

□ □ □ □ □ □

19. For the **Dealers/Retailers** from which you ***primarily*** purchase the products listed below, please indicate if you agree with the following statements: (*check all that apply*)

D E A L E R / R E T A I L E R

	Seed	**Crop Protection**	**Feed/ Nutrition**	**Animal Health**	**Fertilizer**	**Capital Equipment**
a. I will do more business with this dealer/retailer	□	□	□	□	□	□
b. I endorse this dealer/retailer to my neighbors	□	□	□	□	□	□
c. I try products from other dealers/retailers	□	□	□	□	□	□
d. I would switch to another dealer/retailer for a 5% savings	□	□	□	□	□	□
e. I would switch to another dealer/retailer for a 10% savings	□	□	□	□	□	□
f. I would help this dealer/retailer develop new services and product offerings	□	□	□	□	□	□
g. I would invest in this dealer/retailer	□	□	□	□	□	□
h. I am loyal to this dealer/retailer	□	□	□	□	□	□

20. Using a scale of 1 to 9 where 1 means ***"Strongly Disagree"*** and 9 means ***"Strongly Agree"***, how do you feel about the following: (*circle response*)

a. Significant differences exist in the quality of services between similar dealers and retailers
   1 2 3 4 5 6 7 8 9
b. My relationship with sales people is more important than the relationship I have with the company they represent
   1 2 3 4 5 6 7 8 9
c. Significant differences exist between costs of financial options offered by my retailer/dealer than from traditional lenders *(bank, farm credit, etc.)*
   1 2 3 4 5 6 7 8 9

d. Significant differences exist between generic expendable products (seed, *feed/nutrition, etc*) and branded products
   1 2 3 4 5 6 7 8 9
e. I know more about my expendable products than my dealer or retailer
   1 2 3 4 5 6 7 8 9
f. Significant differences exist in the quality of information I receive from different dealers and retailers
   1 2 3 4 5 6 7 8 9

21. On a scale of 1 to 9 where 1 means "***Not at all important***" and 9 means "***Very Important***", how important are the following agricultural salesperson activities? (*circle response*)

    a. Calls me frequently
       1 2 3 4 5 6 7 8 9
    b. Provides good follow-up service
       1 2 3 4 5 6 7 8 9
    c. Is a consultant to my operation
       1 2 3 4 5 6 7 8 9
    d. Brings me innovative ideas
       1 2 3 4 5 6 7 8 9
    e. Provides relevant / timely information
       1 2 3 4 5 6 7 8 9
    f. Brings me the best price
       1 2 3 4 5 6 7 8 9
    g. Provides access to resources
       1 2 3 4 5 6 7 8 9

h. Helps me feel confident about my purchase decisions
1 2 3 4 5 6 7 8 9

22. How would you rate the following areas of risk on a scale of 1 to 9, where 1 means "***Not at all important***" and 9 means "***Very Important***"? (*circle response*)

a. Fluctuations in the prices of things you buy for your farm
1 2 3 4 5 6 7 8 9

b. Fluctuations in prices you receive for your production
1 2 3 4 5 6 7 8 9

c. Fluctuations in yields
1 2 3 4 5 6 7 8 9

d. Being too concentrated in one area of production
1 2 3 4 5 6 7 8 9
(*i.e., diversification needed*)

e. Regulatory compliance
1 2 3 4 5 6 7 8 9

f. Not having adequate land or physical resources
1 2 3 4 5 6 7 8 9

g. Not having adequate skills, knowledge, or human resources
1 2 3 4 5 6 7 8 9

h. Society's view of something happening on your farm
1 2 3 4 5 6 7 8 9

i. Competition
1 2 3 4 5 6 7 8 9

The following questions will be used to group your responses with those of others.

23. What is the highest level of education you have completed?

□ Attended High School
□ High School Graduate
□ Graduate of two-year college/technical /trade program
□ Some four-year college
□ Four-year college graduate
□ Masters degree
□ Advanced graduate work

24. What is your gender? □ Male □ Female

25. What is your age? □ 18-24 □ 25-39 □ 40-54 □ 55-69 □ 70+

26. What is your role in your farm operation?

□ Primary farm decision maker □ Spouse of primary farm decision maker

□ Other family employee □ Other non-family employee

27. In which state is your primary farm business located? (*use state abbreviation*)

_____

28. What were your gross farm sales in 2012?

□ Less than $100,000 □ $1,000,000 - $2,499,999
□ $100,000 - $499,999 □ $2,500,000 - $4,999,999
□ $500,000 – $999,999 □ $5,000,000 and over

29. Over the Next 5 years, describe the single biggest management challenge facing farming operations like yours:

_____
_____

_____
_____

Thank you for taking part in this survey!

Your responses will help researchers at Purdue University better understand U.S. agriculture production and producers like yourself. Additional information about this research is available by contacting David Widmar, Research Associate for the Center for Food and Agricultural Business at Purdue University at (765) 494-0848 or dwidmar@purdue.edu

Please return this survey in the postage-paid envelope provided and the enclosed postcard separately